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THE UNIVERSITY OF ALBERTA

CENTRAL BUSINESS DISTRICT EMPLOYMENT IN EDMONTON

1961 - 1967

by



RICHARD E. PLUNKETT

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH  
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THE UNIVERSITY OF ALBERTA  
FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled Central Business District Employment in Edmonton 1961 - 1967 submitted by Richard E. Plunkett in partial fulfilment of the requirements for the degree of Master of Arts.





## ABSTRACT

There is an immediate need to understand the changes and problems which are occurring in the central areas of our cities. The objective of this thesis is to examine one specific aspect of the central city, changes in employment, as a means towards a better understanding of this important morphological unit of the urban setting. This objective is attained by delimiting the study area and period and by examining specific internal and external factors which could account for changes in employment.

Before decreasing or stagnant Central Business District employment growth can be better understood there is an urgent need to improve the basic assumptions relative to CBD delimitation. Urban geographers must place more emphasis on CBD employment research to enhance the understanding of Central Business Districts.

Positive employment growth is one important aspect of a healthy CBD. Until those most directly concerned realize the importance of employment and its ramifications relative to other aspects of CBD growth many of the problems confronting the central areas of cities today will remain unresolved.





## ACKNOWLEDGEMENTS

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The completion of this thesis would have been significantly delayed had it not been for the assistance of Mr. Ted Komick. A special thanks to Mrs. Deanna Gibb for her competent job of typing, and to my wife, Bonnie, for many hours spent proof-reading.



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## INTRODUCTION

### STATEMENT OF THE PROBLEM

#### Purpose of the Study

The Central Business District<sup>1</sup> is a portion of the city which has been of major interest to geographers. This study focuses upon employment, a component of the CBD which has received little attention from urban geographers. The purpose of this thesis is to identify and account for employment changes in Edmonton's CBD in terms of (1) changes relative to the overall employment pattern in the city; and (2) changes within the CBD study area.

#### The Study Area<sup>2</sup>

The study area occupies the geographic centre of Edmonton's Metropolitan Area (Figure 1). Although its 2.5 square mile area occupies a small proportion of the Metropolitan Area (105 square miles), the study area has had a dominant position in terms of retailing, office functions and related employment opportunities. This dominance has been facilitated primarily by a high accessibility to all parts of the city (Figure 1). All inter - and intra - urban bus and passenger train

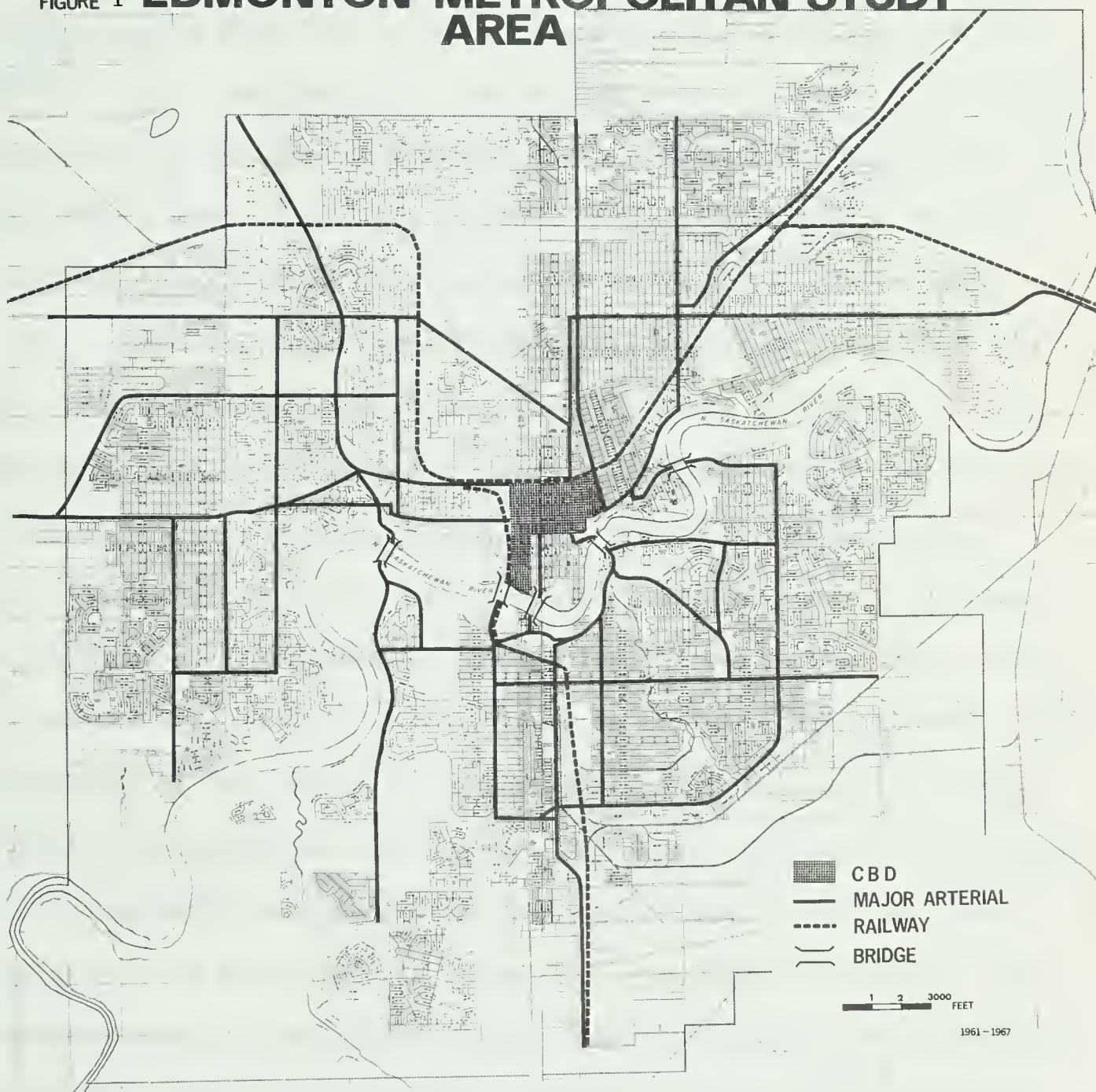
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<sup>1</sup>Ullman, Edward and Chauncy Harris, "The Nature of Cities" Annals of the American Academy of Political and Social Science. CCXLII, November 1945, pp. 7 - 17; Dickinson, Robert E., City and Region, London, Routledge and Kegan Paul Ltd., 1964, 588 pages; Radcliff, Richard U., Urban Land Economics. New York, McGraw Hill Book Co., 1949, pp. 386 -397; and Proudfoot, Malcolm, "City Retail Structure," Economic Geography. XIII, October 1937 pp. 425 - 428.

<sup>2</sup>The delimitation of the study area is discussed in Chapter Two.



**FIGURE 1 EDMONTON METROPOLITAN STUDY AREA**







routes focus on the CBD. The road transportation system also focuses more on this area than on any other location in the city.

### The Study Period and Data Sources

Edmonton's CBD employment change will be examined for the six year period from 1961 to 1967. The selection of this period was related to data availability. The primary sources of data were studies carried out by the City of Edmonton Traffic Engineering Department. No such studies were carried out prior to 1961 or after 1967. The next period for which similar information can be obtained will be 1972.

The City of Edmonton Traffic Engineering Department was the source for data on CBD employment, population and employment for 1967. Population data was checked for accuracy with figures from the Research Branch of the City Planning Department. The Traffic Department's figures were collected by traffic zone for CBD employment, population and employment. Employment and CBD employment was provided from every zone in the city (origin) to every zone in the city (destination). For the purpose of this thesis it was only necessary to calculate those working in the CBD study area zones. This meant examining every origin zone and manually calculating the numbers working in the zones comprising the CBD (destination). This task was simplified because the computer printout (as supplied by the Traffic Engineers) was organized as to male, female and total male - female employed. Only the total employed column had to be regarded for each origin to CBD destination. A thesis by Dale Rhyason, An Investigation into the Modal Split Relationships in the City of Edmonton summarized the same data for 1961 in a form which could be readily used for this thesis. Rhyason's thesis depended



on data originally collected by the Metropolitan Edmonton Transportation Study (METS) of 1961.

1961 data was originally collected by those conducting the METS Study and comprised a ten per cent sample. The 1961 and 1967 origin - destination studies were both carried out in conjunction with a civic census. The 1967 data was more complete, being a 97 per cent sample.

Parking and traffic congestion data were obtained from the Traffic Engineering Department but re-calculating was necessary before it could be presented in a usable form for this thesis. These data were available in the exact form as related by the charts in Chapter Three.

Information on the distribution and numbers of functions in the CBD for 1961 and 1967 were calculated on a block by block basis from Henderson's Directory. The method of calculation and graphic presentation is shown in Chapter Three.

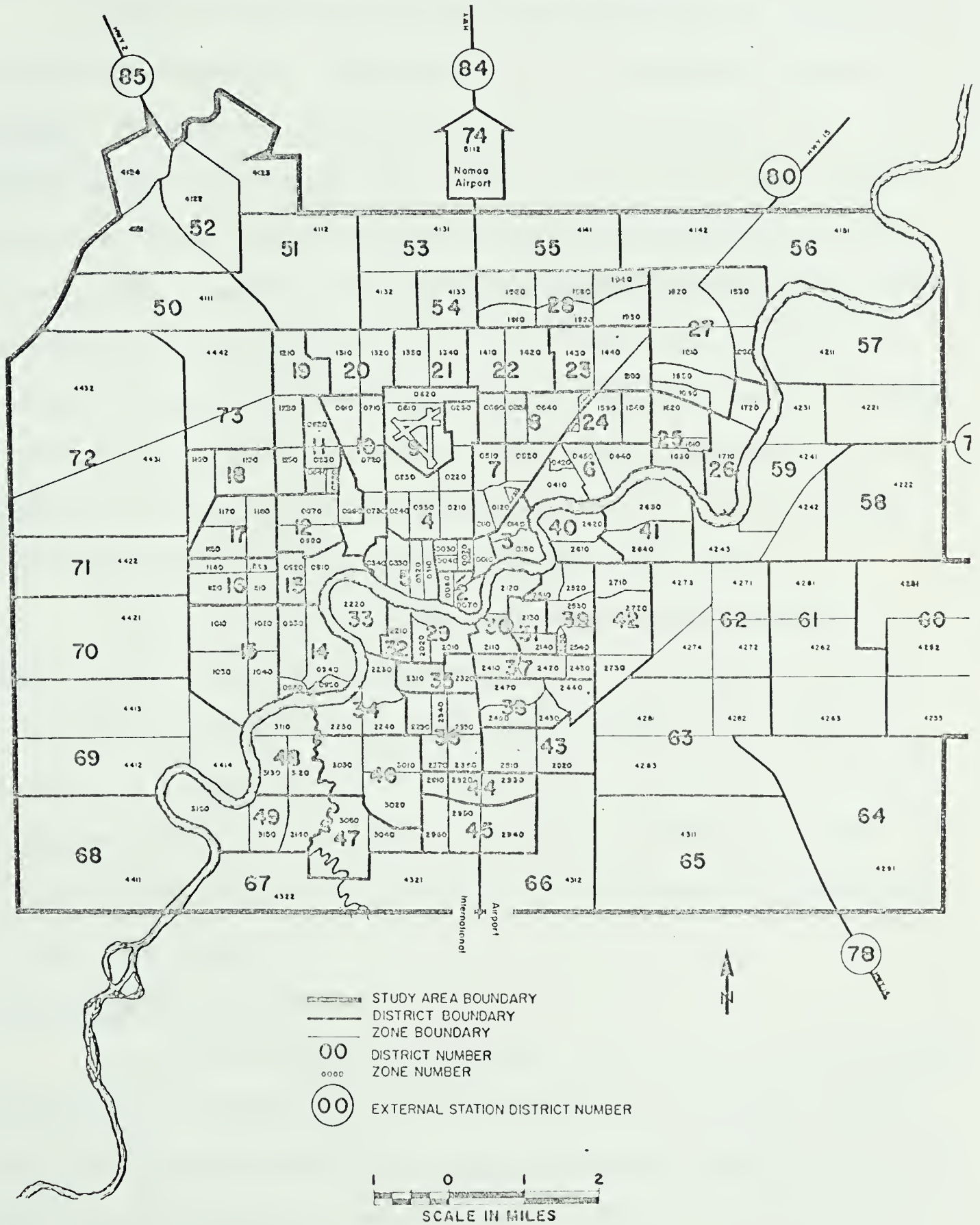
The physical characteristics, quality of buildings, and roads were determined through field work and a zoning registration map which shows the date on which a sub-division or area was first registered to begin construction.

#### METS Zones

The transportation study area for the METS was subdivided into 202 internal zones which were closely related to census tracts. These zones are the basic analytical areas used in this thesis (Figure 2). All data obtained for the study were organized according to these zones. In some cases several census tracts were combined to make one traffic zone, but in most cases the traffic zones used correspond



FIGURE 2 **METROPOLITAN STUDY AREA**  
TRAFFIC ZONES IN THE CITY OF EDMONTON



SOURCE - METS





### Statement of Working Hypotheses

Several factors can be applied in determining the characteristics of CBD employment. These factors will be organized under two headings: (1) specific internal factors and (2) external factors. The internal factors will include such factors as the spatial distribution of functions within the CBD, parking availability, traffic congestion and the physical condition of structures. The external factors consist of population and employment data on a city - wide basis. These data are used to compare the changing proportion of CBD employment in relation to total city employment and to examine the spatial distribution of the residences of CBD employees within Edmonton to see if any relationship between CBD proximity and incidence of CBD employment exist.

Data assembled for the Edmonton Transit System during the summer of 1970 revealed that employment, in an area defined as the CBD by the Traffic Engineering Department, had decreased. The purpose of this study is to test the hypothesis that the following factors account for this decreased CBD employment: (1) increased vehicular traffic; (2) poor parking availability; and (3) decreasing numbers of functions providing jobs in the CBD.

### Organization of the Study

The study consists of three parts: (1) review of the literature on CBD morphology (Chapter One); (2) delimitation of the study area in Edmonton (Chapter Two); and (3) analysis of changing employment characteristics in the study area in terms of the description and explanation of spatial variation within the CBD (Chapter Three). These three parts of the study are summarized in Chapter Four which also contains the conclusions.





## CHAPTER 1

### REVIEW OF LITERATURE ON CBD MORPHOLOGY AND DELIMITATION

This chapter is concerned with a review of literature pertinent to CBD morphology<sup>3</sup> and delimitation. This review will describe the characteristics of the peak-value intersection, the core and frame, and transition zones, followed by a short discussion of the means which have been used in delimiting Central Business Districts.

#### Peak Value Intersection

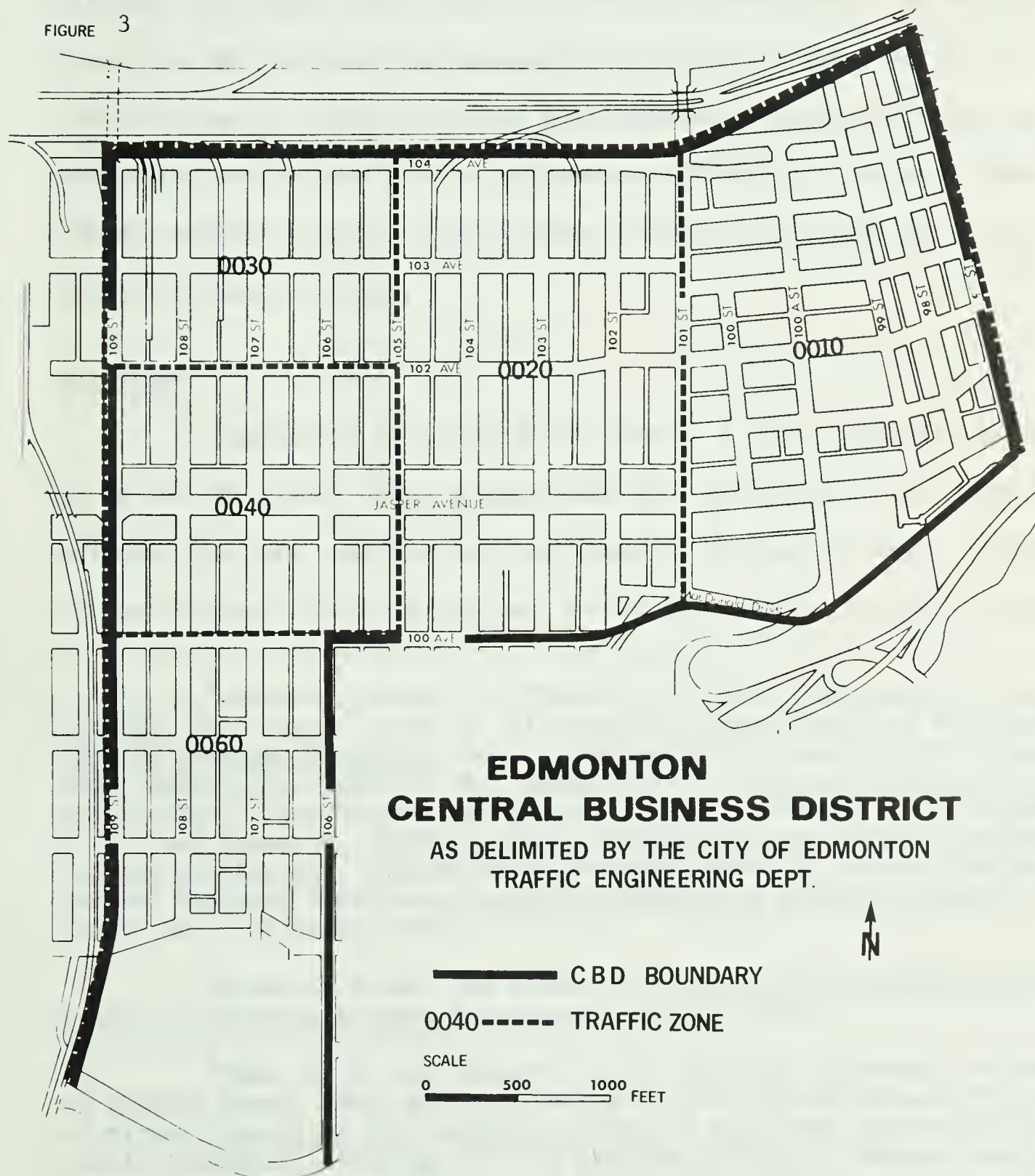
The peak-value intersection is probably the best known location in cities. This intersection usually has the highest land values, the maximum or near maximum vehicular and pedestrian traffic, and is near or surrounded by the tallest buildings in the city. Away from this point these variables decline in intensity. In many cases the peak-value intersection is within a few hundred feet of the geographic centre of the city. Jasper Avenue and 101 Street would be the peak-value intersection (Figure 3).

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<sup>3</sup> Morphology studies the form elements of the urban area. These include the arrangement of streets and railroads, the forms of buildings, in fact the whole urban landscape. Though morphology may relate the current scene, it may also deal with the development of forms and patterns through time, in short with evolution. Morphology, function and evolution are initially inseparable.



FIGURE 3





## The Core

The core, often used concurrently with frame, is the area of the city often equated with the CBD.<sup>4</sup> Horwood and Boyce have progressed further in articulating the concept of a core than most, although they imply their ideas are not fully developed.<sup>5</sup> By definition, the CBD core must be segregated as an area of the CBD. It is characterized by its compactness, high buildings, heavy vehicular and pedestrian traffic and its varied functions (Table 1). Because there are no definite lines as to where the core begins and ends it is a difficult area to define.

## The Frame

Immediately surrounding the core is a tract generally referred to as the CBD frame. Many authors have made reference to the frame,<sup>6</sup> although the main contributions were made by Horwood and Boyce. Because of the dominant nature of the core in the CBD, studies on the frame have

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<sup>4</sup>Wenzlick, Delbert S., "Pedestrian Traffic," National Real Estate Journal. XXXI August, 1930, p. 23; Hoyt, H., "City Growth and Mortgage", Insured Mortgage Portfolio. Vol. 1, Numbers 6-10, December 1936 - April 1937; Murphy, R., Vance, J. E., Epstein, B. J., Central Business District and Studies. Clark University, Worcester Mass., January 1955; Horwood, E. M., and Boyce, R., Studies of the Central Business District and Urban Freeway Development. Seattle 1959; Browning, Clyde E., Recent Studies in Central Business Districts, American Institute of Planners Journal. Vol. XXXVII No. 1, February 1961.

<sup>5</sup>Horwood, E. M., and Boyce, R., Studies of the Central Business District and Urban Freeway Development. Seattle 1959.

<sup>6</sup>Park, R. E. and Burgess, E. W., The City. (Chicago) University of Chicago Press, 1925; Harris, Chauncy D., and Ullman, Edward, "The Nature of Cities", Annals of the American Academy of Political and Social Science. CCXLII, November, 1945, pp. 7 - 17; Browning, Clyde E., "Recent Studies in Central Business Districts", American Institute of Planners Journal. Vol. XXVII, No. 1, February 1961, pp. 82 - 87; Horwood, E. M., and Boyce, R., Studies of the Central Business District and Urban Freeway Development, Seattle 1959; Hayes, C. R., and Schul, N. Greensboro Retail Core Analysis, Greensboro, North Carolina, 1965.





TABLE 1 - CBD CORE CHARACTERISTICS

CHARACTERISTICS	PROPERTIES
1. Land use: offices, retail, consumer services, hotels, theatres, banks (multi-storied in nature)	Most intensive land use both from the economic and social aspect
2. Growth: vertical rather than horizontal	Highest buildings within the metropolitan area
3. Dimensions: rarely over one mile horizontally with emphasis on walking	All businesses concentrated and all are within walking distance of one another
4. Traffic: area of heaviest pedestrian and vehicular movements, major public and private interchanges for vehicles	Heaviest concentration of parking, roadway and sidewalk allowances in the city
5. Linkages: inter-office and inter-personal linkages at their highest point	

generally been ignored. Unlike the core, the frame is much more complicated and

there are invariably about a half-dozen distinct sub-regions within the frame areas of our North American metropolises, and in fact including European cities as well. One typically finds within this region such activities as wholesaling with stocks, transportation terminals, medical service centres, automobile services and often some manufacturing or assembly of goods.<sup>7</sup>

The peak-value intersection, the core and the frame contain a great variety of functions and therefore, offer a similar variety of employment opportunities. The outline of their morphologies points

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<sup>7</sup>Horwood, Edgar M., and MacNair, Malcolm D., "The Core of the City: Emerging Concepts", Plan Canada. Vol. 8, No. 3 (1961) pp. 108 - 114.



out that their physical structure has been researched by a number of geographers. However, the subject of employment as related to these areas has not, in the opinion of this author, received sufficient attention.

### Transition Zone

The transition zone is usually considered as the area which separates the commercial heart of the city from surrounding tracts of homogenous land use. It is an area which is strongly represented by mixed, non-commercial land use of variable quality focused on vehicular rather than the pedestrian movements which are more characteristic of the CBD. The transition zone is dominated by the flow of goods rather than pedestrians.

Preston divided his transition zone into three subregions: (1) the sector of active assimilation; (2) passive assimilation; and (3) general inactivity which is further divided into goods handling functions and low income housing.

1. Active Assimilation: This is the area into which the CBD is actively expanding. The dominant features of this area are its higher class multi-story homes, governmental institutions, tree lined streets, new apartments, new office structures and numerous institutions and commercial establishments.

2. Passive Assimilation: This subregion represents the area from which CBD activities are moving. This area of discard is the old downtown, characterized by widespread land conversion, vacancy, and skid row functions. Interspersed are railroad stations and facilities, warehousing, wholesaling, and light industry.



3. General Inactivity: Relative to the two previously discussed areas this sector is experiencing very little change. Changes are often government initiated urban renewal schemes. The area is dominated by low income housing, wholesaling and light industry, and transportation depots. Housing of poor to excellent quality is found throughout the zone. The boundaries between sectors and along the inner and outer boundaries remain vague.

The outer boundary is defined by tracts of homogenous land use; for example, residential neighbourhoods, rail road yards, heavy industrial districts, large open spaces, and the inner edge of the zone forms a vague boundary line where governmental, organizational, wholesale - storage, light industrial, and parking activities merge with the retail, service and office complex of the CBD<sup>8</sup>

The transition zone has traditionally been viewed as an area of mixed commercial and non-commercial land use tending toward deterioration and blight. It separates the commercial heart of the city from surrounding residential or industrial areas. Except for governmental functions the area has not traditionally been a major employer. This can be attributed to its peripheral location relative to the core of the city and its internal blight and general obsolescence.

The central areas of cities exhibit regular patterns of activities and land uses which are distributed in definable areas. There is some disagreement as to where the boundaries of these areas begin and stop but within the areas there is a general acknowledgement that they do constitute the central areas of cities. Knowing that each of these areas constituting the central cities is unique in its own way, it is

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<sup>8</sup>Preston, Richard E., "A Detailed Comparison of Land Use in Three Transition Zones", Annals. Vol. 58, No. 3, September 1968, p. 437.





hard to understand why little thought has been given to employment in these areas. It would appear to be a natural concern. One of the major reasons for this thesis is to contribute to this general lack of knowledge relative to employment in central areas of cities and more specifically their Central Business Districts.

#### CENTRAL BUSINESS DISTRICT DELIMITATION

It is necessary to delimit the CBD study area prior to examining CBD employment. The means and methods of delimitation and their reliability have long been of concern to urban geographers. The purpose of this section of Chapter one is to review these techniques to provide an understanding to facilitate the selection of the CBD study area in which employment may be examined.

The magnitude of the problem of CBD delimitation is well stated by Murphy:

In view of the importance of the Central Business District it is indeed remarkable that until recently no standardized method of delimiting the district had been developed. For each city the limits of the central business district had been a matter of local judgement. This is all very well for the planner in an individual city, working on local problems, but it is only through the use of a standardized method of delimitation that significant comparisons of central business districts are possible.<sup>9</sup>

The most widely accepted and applied technique of CBD delimitation was developed by Raymond Murphy and James E. Vance. Their technique was called the Central Business Index Method (CBI).

Murphy and Vance did not consider this method to be all inclusive and universal but merely as a first step towards developing a

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Murphy, Raymond E., The American City. McGraw Hill Book Company New York, 1966. pp. 284 - 285.





method of common usage. They admitted to the subjective classification of central business uses. For a method which was designed as a first step to standardized CBD delimitation, its subjective nature left its reliability and validity much in doubt. However, little research has been done to improve the method and many geographers consider it almost as a final method. This acceptance of a dubious technique portrays the extreme difficulty in measuring CBD boundaries and presents the question as to whether it is possible to devise a universal method for comparative purposes.

Several other means of analysis have been used to delimit CBD boundaries.<sup>10</sup> These include gross rateable values and other techniques for measuring land values, (appraised or assessed values), traffic flows, pedestrian flows, vertical movement of people, shop rent index, volume of trade, retail sales attraction, population and patterns of employment. These means of analysis all suffer from problems which prevent them from being applied to a standardized method of delimitation. Pedestrian and traffic flows suffer from the problem of separating those who use the CBD and those who are passing through. Vertical movement of people would be bi-modal in character because of the high rises in the frame area. Shop rent index (total of rents of a building/length of frontage) is very subjective as to the cutoff point as is volume of trade and retail sales attraction.

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<sup>10</sup>Mattingly, P. F., "Delimitation and Movement of CBD Boundaries Through Time: The Harrisburg Example", Professional Geographer 16. 1964, pp. 9 - 13; Davies, D. H., "Boundary Study as a Tool in CBD Analysis", Economic Geography 35. 1959, pp. 322 - 345; Carter, H., and Rowley, G., "The Morphology of the Central Business District of Cardiff", Institute of British Geographers Transactions. No. 38, June 1966, pp. 119 - 133.



These methods of CBD delimitation are inadequate if the aim of urban geographers is to find a method of delimitation which can be used on a comparative basis from city to city. Geographers should consider whether or not an arbitrary boundary is just as beneficial.

Clyde E. Browning reviewed a number of articles on Central Business Districts.<sup>11</sup> Though Browning did not carry out a study on delimitation he did question the methods in use, and introduced other considerations. Browning felt that the internal arrangement of activities is such that they do not lend themselves to arbitrary delimitation of continuous boundaries. He also concluded that each CBD should be delimited in terms of the purpose at hand relative to its unique set of circumstances. This is a valid contribution for the uniqueness of each CBD does not allow for a universal method of delimitation.

There is valid reason to question the need for universality and in fact whether or not it is possible. The immediate need of this thesis was to examine the nature of CBD employment in Edmonton and provide information which is seriously lacking in this field. The CBD boundary was then selected to best suit this purpose.

Having decided to apply Browning's principle of using the purpose at hand for the selection of a CBD boundary, two factors had to be analysed.

1. A boundary had to be selected which would include the major employers in the downtown area.

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<sup>11</sup>Browning, Clyde E., "Recent Studies in Central Business Districts", American Institute of Planners Journal. Vol. XXVII No. 1, February 1961, pp. 82 - 87.

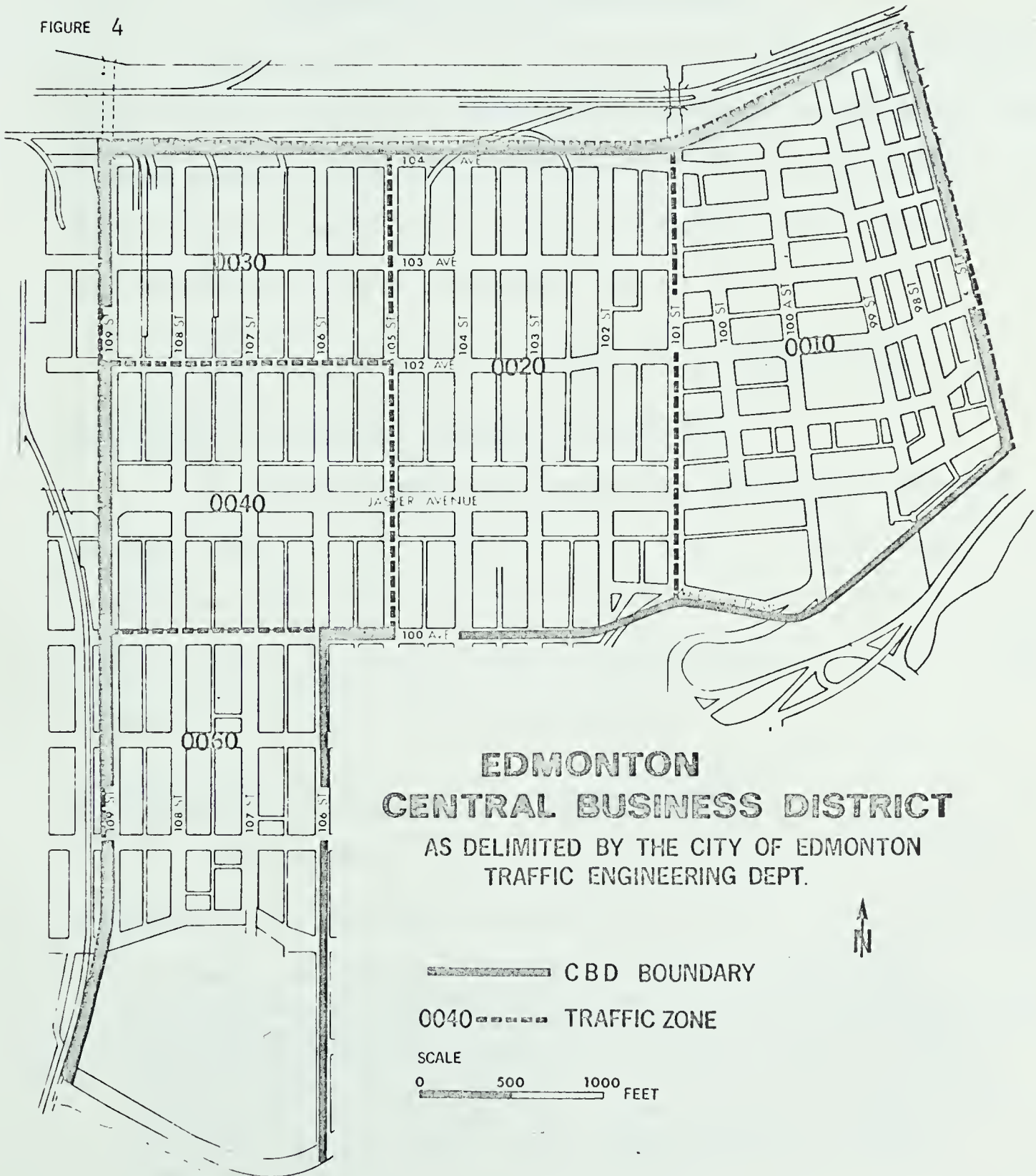


2. The boundary ideally should accommodate the traffic zones of the METS study, for the data to be analysed could not be broken down any finer than by traffic zones.

On the basis of the above two points, zones 0010, 0020, 0030, 0040 and 0060 were selected to represent the CBD area as would be used in this study (Figure 4). These zones appear to be high generators of employment and all exhibit the necessary functions which are characteristic of CBD areas. For the purpose of this thesis, CBD employment analysis, these are the most adequate boundaries. The actual characteristics of these zones will be discussed in Chapters two and three.



FIGURE 4









## CHAPTER II

### DELIMITATION OF THE CBD STUDY AREA

This chapter is concerned with the selection of a study area which suits the purpose of examining CBD employment in Edmonton. Three previous attempts at delimiting Edmonton's CBD will be outlined to determine their suitability for use in this thesis. The study area is then defined and its morphology described.

#### PREVIOUS METHODS EMPLOYED IN DELIMITING EDMONTON'S CBD

##### City of Edmonton Traffic Engineering Department

In 1961 the Engineering Department delimited an arbitrary boundary made up of METS traffic zones to measure traffic congestion in Edmonton's CBD. Their boundary (Figure 4) was very extensive and delimits an area in central Edmonton which includes the CBD as it was delimited in the following two discussions.

##### Draft General Plan for the City of Edmonton 1963

Two variables, land use and land values were employed by the Edmonton City Planners in delimiting the CBD for the General Plan.

Following the method suggested by Murphy the peak-value intersection was located at 101 Street and Jasper Avenue. The maximum value was referred to as the 100 per cent lot, comparison of cities in the U.S.A. revealed that the approximate boundary of the CBD was a line 5 per cent of the value of the peak-value intersection. Edmonton is no exception to the rule, the 5 per cent line forming the limit of frame uses, as described by several authors.<sup>12</sup>

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<sup>12</sup>Draft General Plan for the City of Edmonton. Part 111, page 6.



This method produced the CBD as shown in Figure 5.

University of Alberta Thesis 1967

Michael Bannon in his thesis,<sup>13</sup> The Evolution of the Central Area of Edmonton, Alberta 1946 - 1966 employed the Murphy - Vance technique of CBD delimitation. Although he used a similar delimitation technique, Bannon's CBD varies significantly with the Planning Department's in the area between 100 Street and 97 Street (Figure 6). This difference can be explained by the shifting nature of the CBD as Bannon's study was carried out five years after that of the Edmonton Planners. This is an area of discord and reveals the need for delimiting a CBD area which will allow for these shifts in the study of change in the CBD over time. The Traffic Engineers' delimitation includes all those areas included in Bannon's CBD and those of the Planning Department. Since the present study is concerned with employment change over a six year period, it was decided to use the larger CBD area as delimited by the Traffic Engineering Department to minimize the forementioned problems.

It is more accurate to state that this thesis delimits an area in central Edmonton which includes the CBD and an undefined area on the fringe of this district. Therefore, the term, "CBD" refers, in this study, to this larger area.

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<sup>13</sup>Bannon, Michael Joseph, The Evolution of the Central Area of Edmonton, Alberta, 1946 - 1966, Unpublished M. A. Thesis, Department of Geography, University of Alberta, 1967.



FIGURE 5

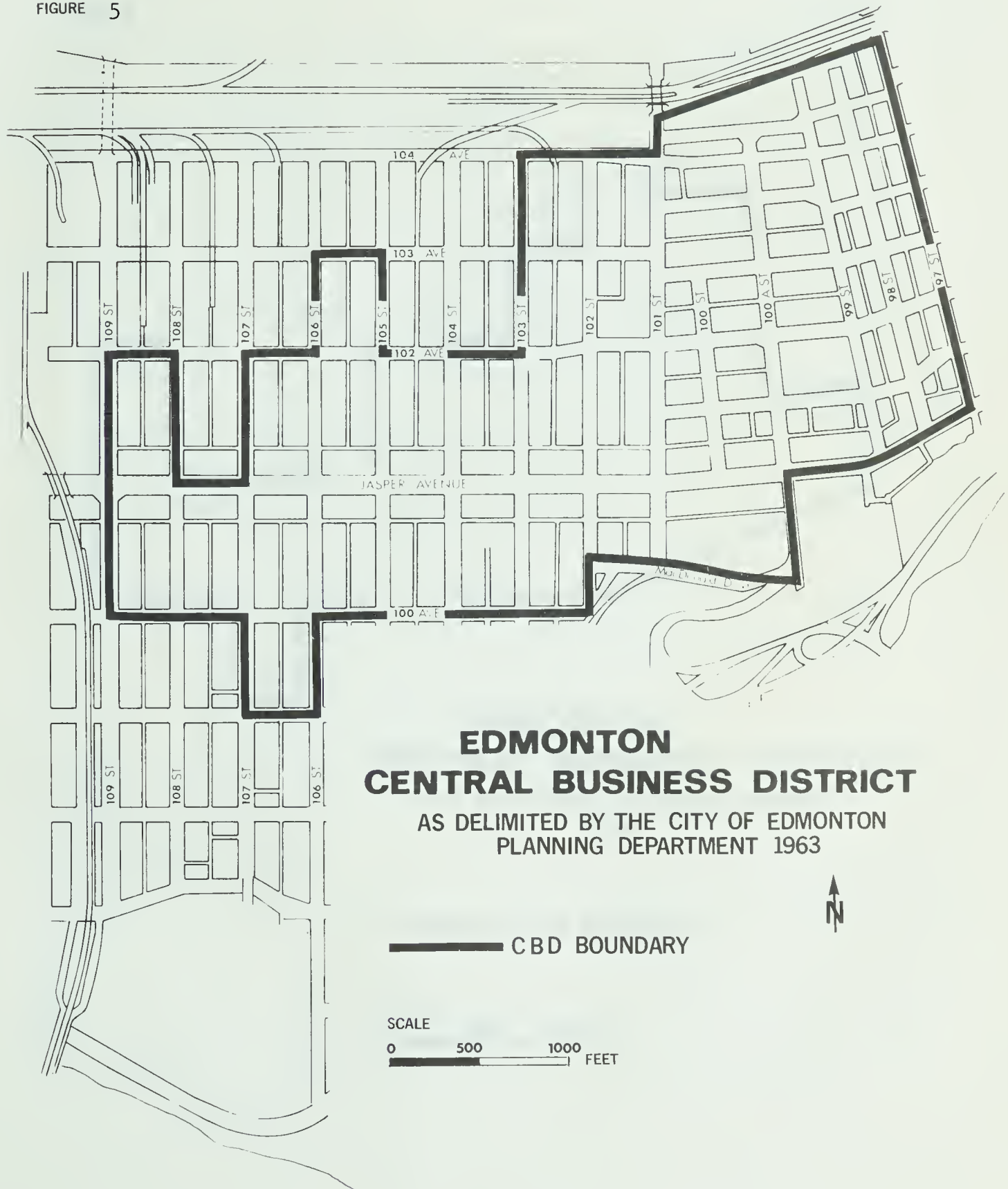
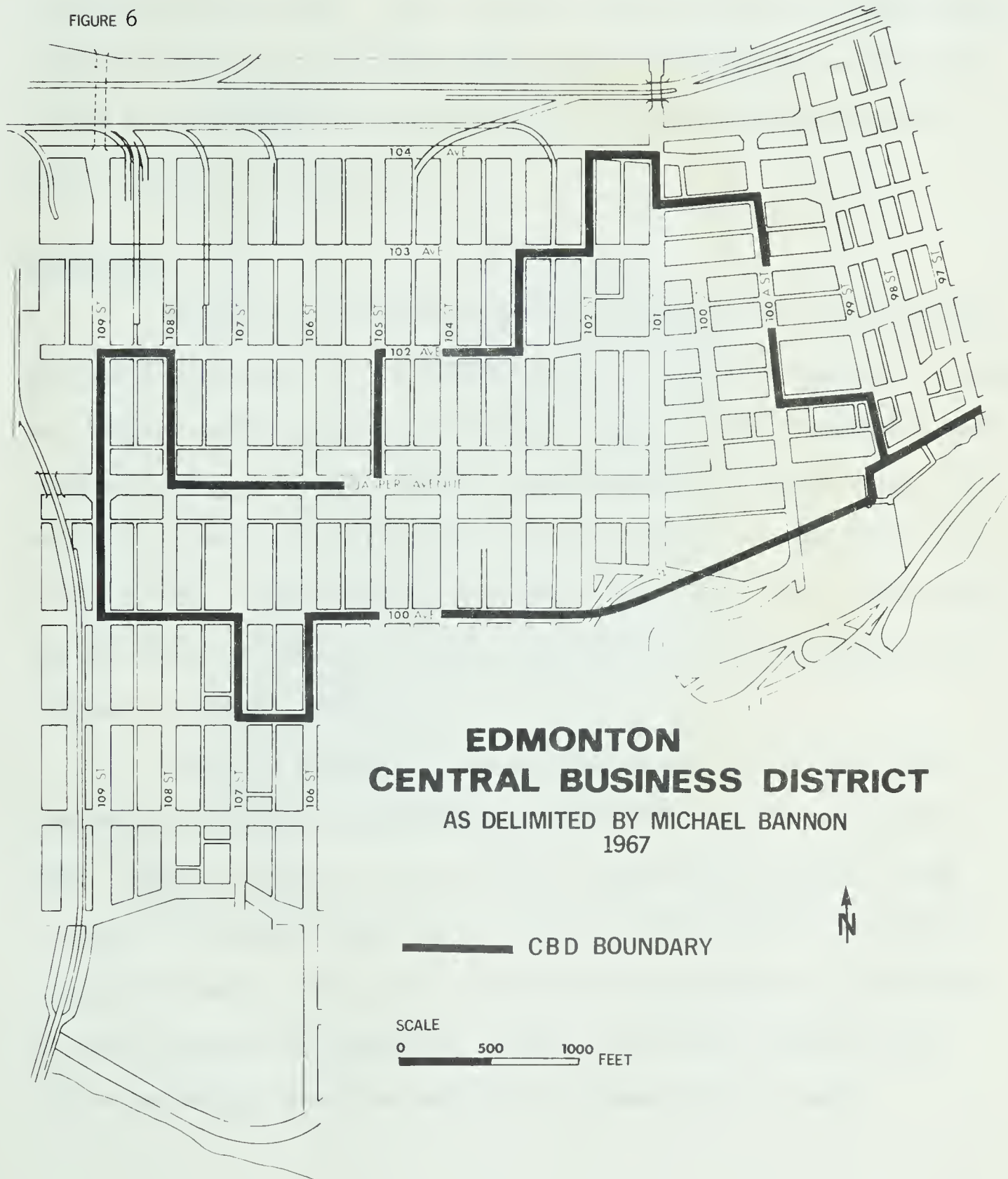






FIGURE 6







## MORPHOLOGY OF THE CBD STUDY AREA

It is recognized that the arbitrary delimitation method used in this study results in a study area which is larger than the traditionally accepted CBD. This section outlines the basic morphological characteristics of the traffic zones within the study area, thus providing the reader with a more detailed description of the variation within these zones (Figure 3).

Zone 0010

Relative to the rest of the city the CBD has tall buildings, the heavy pedestrian and vehicular traffic, continuous building coverage and intense retail activity. Zone 0010 exhibits these elements. The tallest buildings in the city are located within its boundaries; the heaviest pedestrian traffic concentrates at 102 Avenue and 101 Street, the peak-value intersection is located at 101 Street and Jasper Avenue, and the heaviest vehicular traffic is found at the same intersection (Figure 7; Plates 1 and 2).

The area (in total number of functions) was 72 per cent dominated by retail - service functions in 1961, and 76 per cent in 1967. Retail functions rose 5 per cent between 1961 and 1967 to 36 per cent of the total functions. All other functions were characterized by decreases. New retail outlets are relatively small in terms of floor area and are generally located on the main floors of new office buildings which are proliferating throughout the area.





Plate 1. Multi-storey buildings typify the peak-value intersection at 101 Street and Jasper Avenue.



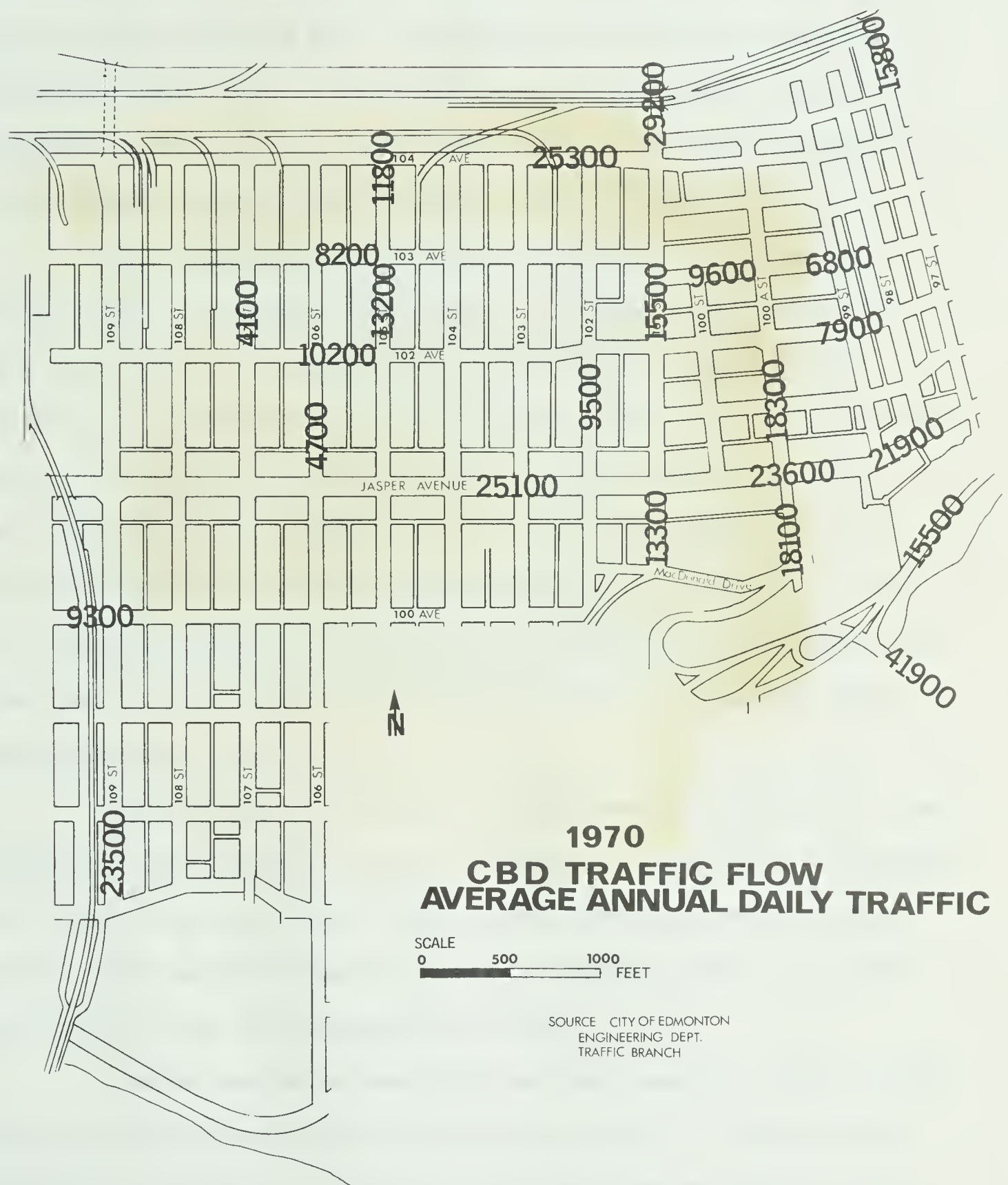


Plate 2. Some of the heaviest vehicular and pedestrian traffic in Edmonton is concentrated at the 101 Street and Jasper Avenue peak-value intersection.





FIGURE 7





The eastern portion of the zone contains the zone of discard. Within this area of the zone many dilapidated structures are found. Between 1961 and 1967 very little new construction occurred within this region east of 99 Street. Many stores in the area are relatively small wood frame structures. This is the oldest section of the downtown area (Plates 3 and 4).

By contrast, the area west of 99 Street was characterized by an increase in building construction. The 1961 - 1967 period saw the construction of numerous multistoried structures, most notably the CN Tower, Centennial Building and the Centennial Library (Plates 5 and 6). The construction of these buildings is rapidly increasing the dominance of office functions in the area. Many banks and other financial functions have also located in the zone, as have the offices of the civic government. 37 out of the city's 50 public transportation lines have parts of their routes passing within the boundaries of the study area (Figure 8).

Daily traffic flow (1970) also indicates that the area is one of principal attraction in the city (Figure 7). All Streets and Avenues have a daily flow of at least 5,000 vehicles per day with the Jasper Avenue section and 101 Street intersection handling well over 20,000. Few streets in the city approach this usage.

A major portion of zone 0010 has been zoned CC - civic centre although a small portion will be allowed to pursue C - 4 development (Appendix A; Figure 9). These two classifications will help to maintain the area as the major office centre of the city for some time, with the retail and service functions playing an important, but lesser role.





Plate 3. Old, poorly maintained buildings, typical of zones of discard can be found in the eastern sections of zone 0010.







Plate 4. Very old, brick structures are typical of the Jasper Avenue section of the zone of discard in traffic zone 0010.







Plate 5. The area west of 99 Street in zone 0010 was characterized by vigorous building construction during the study period. These buildings are typical of the structures which have been built in Edmonton's civic centre.



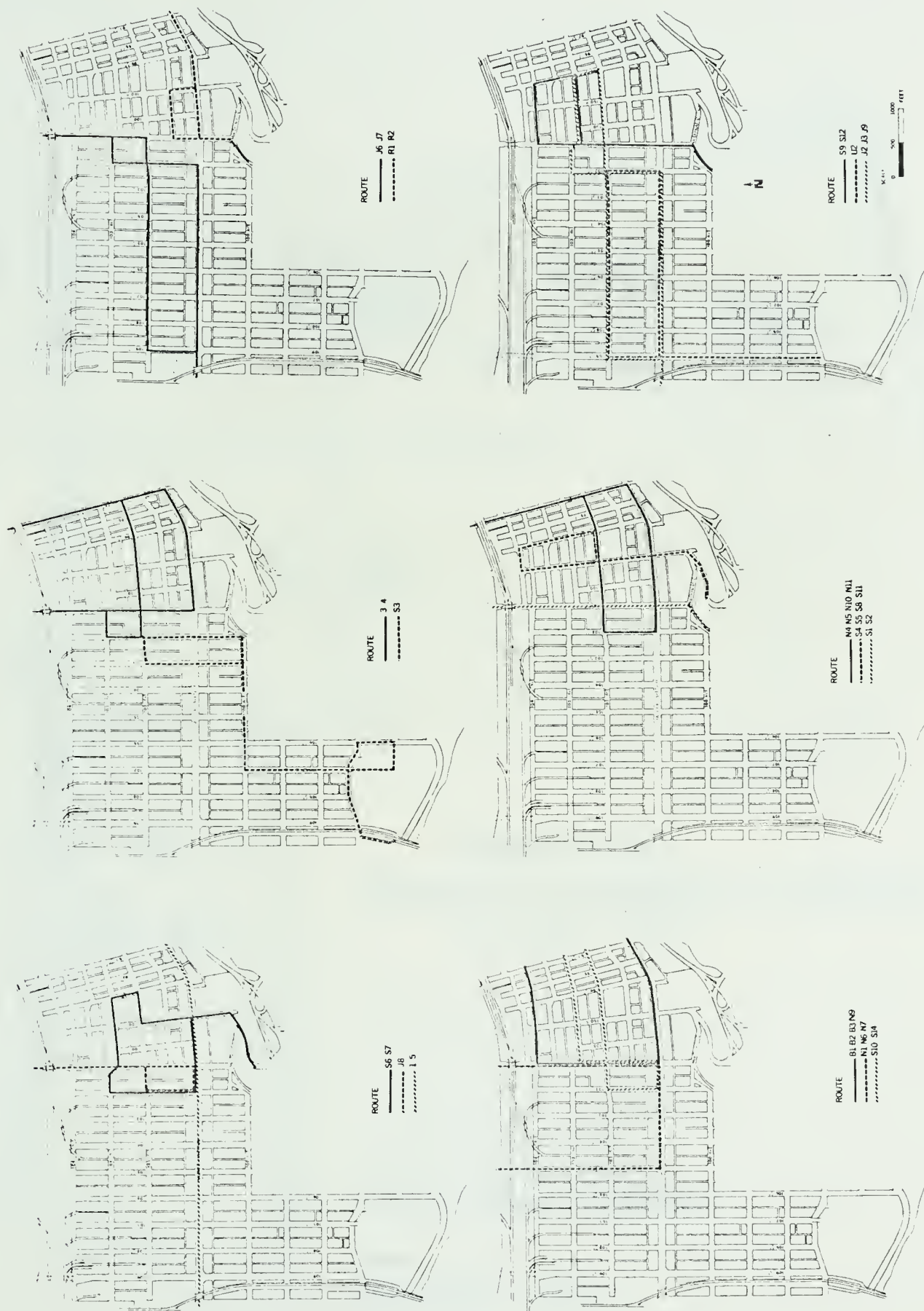


Plate 6. Large, high-rise structures dominate the skyline of zone 0010 west of 99 Street.



FIGURE 8

# CBD PUBLIC TRANSPORTATION ROUTES

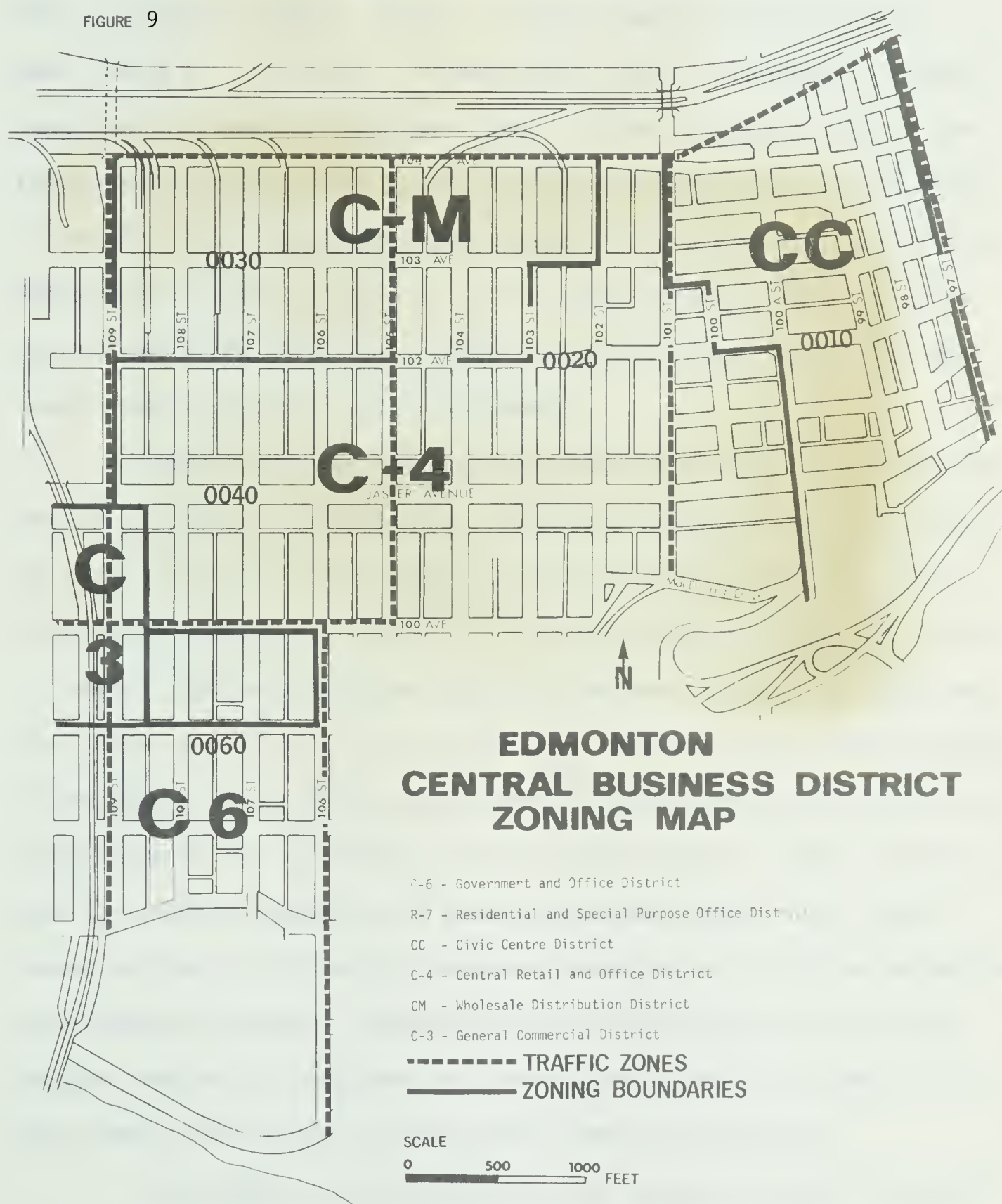


Source: Edmonton Transit System  
Route Map 1971











Zone 0020

Zone 0020 varies from zone 0010 primarily because of its lack of vertical growth. Retail - service functions dominate the zone (Table 7; Plate 7). Between 1961 - 1967, the number of retail functions increased by eight per cent. By 1967 fifty per cent of the functions were retail thus distinguishing the zone as the retail heart of the city. In 1961, forty-five per cent of the functions were office and service oriented (Table 7), in 1967 they had dropped to forty per cent of the total functions. This shows the relative increase on the importance of retailing within the zone.

Retail functions decreased in importance towards the northern part of the zone where wholesale - warehouse activities dominate (Plate 8). The area north of 102 Avenue is dominated by old brick structures which in most cases are over fifty years old, and are about six stories in height. The area exhibits a general run down appearance. Many rail spur lines enter this portion of the zone (Plate 9). The retail portions of the zone south of 102 Avenue exhibit a relatively well-kept appearance though many of the structures are very old. Many have been renovated and give the outward appearance of being bright and modern. The Jasper Avenue portion of this retail dominated area is one of intense pedestrian and vehicular movement. Towards 105 Street the character of the zone changes from retail dominated to a mixture of retail and service. The area south of 102 Avenue has many restaurants and theatres.

Zone 0020 is characterized by two types of zoning, CM and C-4 (Appendix A). The C-4 sections is an extension of the C-4 area of Zone 0010 (Figure 9). Its location is primarily in response to the area's maximum accessibility, both for pedestrians and vehicles. Such an





Plate 7. These small retail stores on 101 Street are typical of the retail functions which dominate the southern section of zone 0020.







Plate 8. Old, brick, wholesale - warehouse establishments dominate the area north of 102 Avenue in zone 0020.







Plate 9. Rail spur lines found in the wholesale - warehouse section of zone 0020 are indicators of the age of the zone and its link with past technology.



accumulation of like functions can only cause a situation of symbiotic dependence in which the drawing power of each function is certain to add to the business of the other. The area north of 102 Avenue is designated CM (Figure 9). This designation will most likely maintain this portion as a dominate wholesale - warehouse distribution area for some time. The zone exhibits numerous core area characteristics while its outer reaches demonstrate frame characteristics as described in Chapter one. As was the case in Zone 0010, Zone 0020 maintains a fairly accessible position relative to public transportation (Figure 8) for thirty-three out of fifty routes transect the Zone. Daily traffic flows are very high, with some sections of Jasper Avenue exceeding 25,000 vehicles a day.

#### Zone 0030

Warehousing and wholesaling dominate Zone 0030. In 1961, warehousing and wholesaling accounted for forty-five per cent of the functions in the Zone, but by 1967 this had decreased to thirty-five per cent (Table 7). Retailing and service functions accounted for forty-three per cent in 1961 and forty-four per cent in 1967. This figure is somewhat misleading for, in terms of area covered, the whole-sale - warehouse portions occupy a major portion of the Zone. Whereas one warehouse may cover an entire block, the same block could house numerous small retail outlets. Because of this factor, wholesaling and warehousing are considered to dominate. For this same reason, office functions dominate in Zone 0010 even though retail service functions have more establishments. The nine per cent decrease in wholesale - warehouse activities is indicative of the losses which are occurring



in most Canadian cities in the wholesale - warehouse areas. Buildings, in most cases, are very old and were originally designed for rail movements as is demonstrated by the loading platforms which were designed to be served from the side of a boxcar (Plate 10). Today, truck transport and continuous conveyor systems are the required means of freight movement for warehousing and wholesaling. These new requirements are not adaptable to these older structures.

General deterioration is portrayed by poorly maintained buildings, streets and sidewalks. The general depressed state of the area is extenuated by numerous deteriorating woodframe structures, and obsolete brick structures (Plate 11). Trucks servicing the area usually block streets thereby impeding traffic (Plate 12). The narrow laneways once used for rails, are not wide enough to accommodate a truck which unloads from the rear. This makes unloading and loading a tedious and somewhat expensive task because of the additional handling time.

The area is synonymous with the frame areas as discussed per Horwood and Boyce and Richard Preston. Scattered throughout the area are multistoried, aging, residences, small businesses, and numerous small industrial and manufacturing firms. In general, the area is in a state of deterioration. Zoning, CM (Appendix A) is unlikely to increase the attractiveness of the area to new functions. Accessibility is a major problem for Zone 0030. The area is serviced by only three public transportation lines (Figure 8) and two of these, the J3 and J9 run only during the peak hours. Of all the zones comprising the CBD, this zone has the poorest accessibility. It is bordered by tracks on the north, Canadian National, and on the west, Canadian Pacific, which severely cuts







Plate 10. Zone 0030 is dominated by wholesale - warehouse functions. It is the true wholesale - warehouse zone in Edmonton. Buildings were designed to service railroads as is signified by loading platforms designed to unload box-cars from the side.





Plate 11. Zone 0030 is characterized by deteriorating structures which have lost their attractiveness because changing technology has placed a new emphasis on the handling of goods.





Plate 12. Loading platforms, previously designed for box-cars must now be used by trucks. This causes it to interfere with vehicular and pedestrian traffic in the zone.





down on the accessibility, for traffic can only cross or tunnel the tracks at three locations, 109 Street, 105 Street and Jasper Avenue. Traffic from the east must transect a major proportion of the CBD with its heavy vehicular traffic.

Minimal building construction took place within the region during the 1961 to 1967 study period. It would appear that a new zoning coverage is forthcoming in the area, possibly to allow for residential development of a higher density in the form of walk - up and high rise apartments. The area is plagued by problems of obsolescence brought on by changing technology and old age. This is causing the decentralization of its original functions and a lack of activity within the area.

#### Zone 0040

As might be expected of an area which is transected by Jasper Avenue and its heavy flow of vehicular traffic (Figure 7), Zone 0040 is dominated by retail - service functions. Furniture stores and automobile showrooms are the mainstay of the region. Retail - service functions accounted for sixty-four per cent of the functions in 1961 and sixty-six per cent in 1967. The Jasper Avenue transect provides the main emphasis for these functions. Very little construction occurred within this region from 1961 - 1967 except for the corner of Jasper Avenue and 109 Street, which saw the construction of a multistorey office building. This structure, along with the Professional Building provide the only new structures of significance within the zone. Most retail establishments are in older run-down centres and the lack of higher order functions such as women's fashion houses could be a reflection of light pedestrian movements. This zone is the zone of assimilation. As the city's centre





moves west it might be expected to maintain some degree of prosperity and upgrading, as can be seen by the construction of the Executive and Professional Buildings. This hypothesis is strengthened by the fact that the zone is designated for C4 development (Appendix A).

Zone 0040's main advantage relative to future growth is its accessibility. Five public transportation routes transect the area of which two routes, the 1 and 5 are trolleys providing fifteen minute headways (one bus every fifteen minutes) making the area even more accessible (Figure 8). These routes also provide direct transit connections to nearly every area of the city.

#### Zone 0060

Zone 0060 represents the only area of the CBD which is thoroughly dominated by public functions. Though they accounted for only thirty-one per cent of the land use in 1961 and thirty-five per cent in 1967, the same comparison can be made here as was the case in the wholesale - warehouse district. One government function, i.e. Federal Building, could occupy an entire block and be several stories while one half block facing 109 Street could house several retail outlets. With this in mind a careful examination of the functional breakdown and actual area covered will adequately demonstrate the dominance of public functions within the area (Figures 17 and 18). A secondary land use, office functions, has been decreasing in actual numbers (Table 7).

The zone is neatly maintained with many large mature trees, stately homes and neat lawns. However, some intrusions have occurred. The Northeast portions have been zoned R-7 (Appendix A), and apartments



will subsequently replace many of the older homes. This zoning will also increase vehicular and pedestrian movements within the area. This factor is likely to draw in many retail and service functions necessary to serve this increased population. The only other zoning type to infringe on the dominant C-6 is an extension of Zone 0040's C-3 development (Appendix A). This will most likely become an area of increased retail and service activity both for the high rise developments and in response to the heavy populations generated by the government functions. Increased retail, office and service functions might also be expected on the ground floor of the R-7 developments.

Although the area is directly serviced by only two public transportation routes, the U2 and S3, it remains extremely accessible being only a short walk to Jasper Avenue and a wide variety of transit routes (Figure 8). Also of major importance, not only to this zone but to zones 0010, 0020, and 0030, is the future possibility of Rapid Transit which will greatly increase the accessibility of these regions especially to the core and the University. The accessibility of Zone 0060 is further enhanced by its access to the High Level Bridge to the south, along the 105 Street Bridge and 109 Street north and Jasper Avenue and 102 Avenue to the west. This accessibility however, is severely hampered by the heavy traffic flows on 109 Street, Jasper Avenue and all other major access routes (Figure 7). This can only be expected to worsen if new building construction increases.

The CBD boundary as determined by the Traffic Engineering Department offered the best solution to the problem of delimitation as described in Chapter one. This boundary allows for the changes

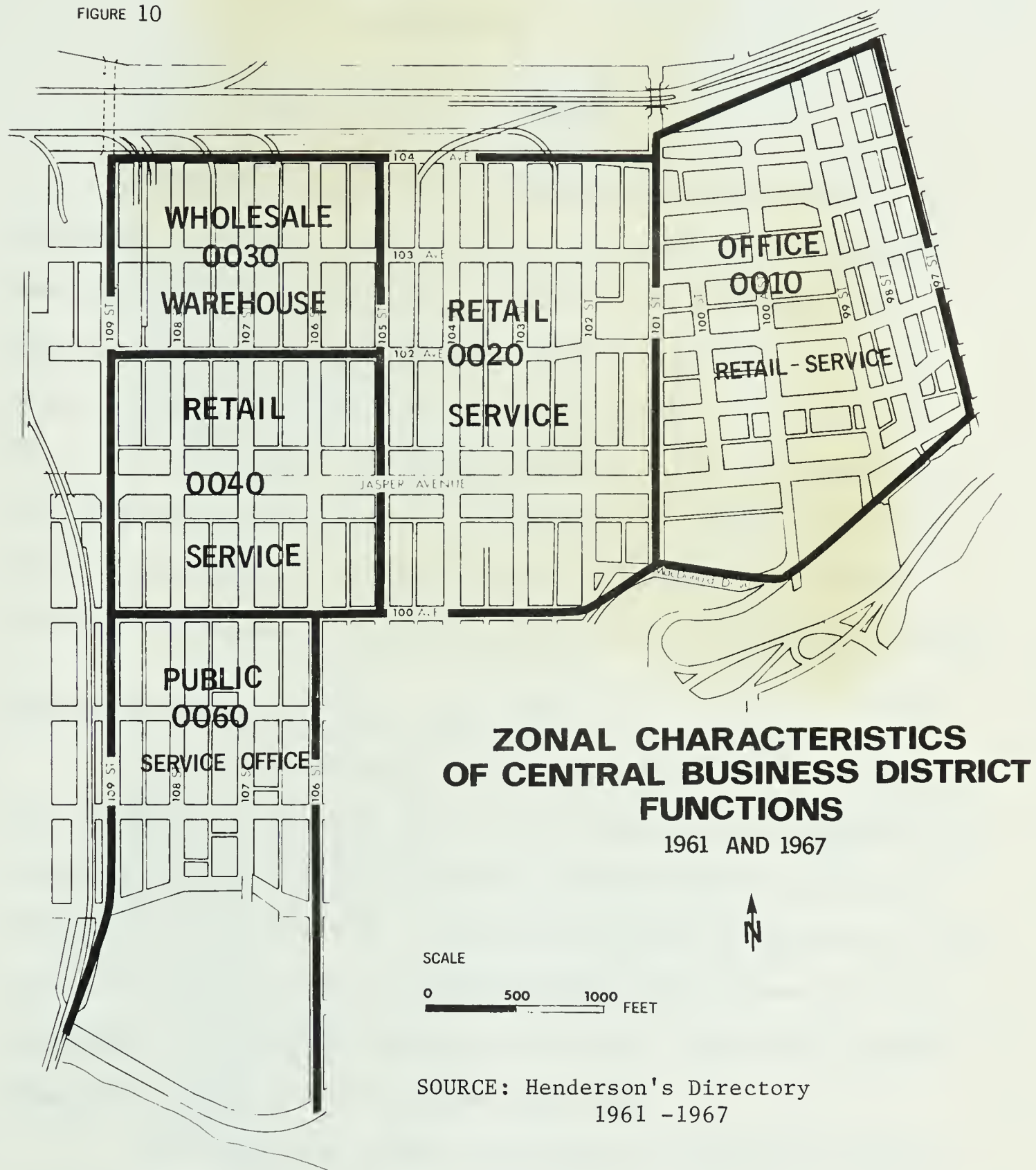


which occur over time due to the shifting nature of the CBD thus making it satisfactory in examining CBD employment over a six year period, This delimitation also corresponds to the boundaries for which data is available. Also, the study area was divided into six zones during the METS Study allowing for a finer analysis of the Edmonton CBD as data was available for each zone. Analysis has shown that each zone is characterized by its own problems and individuality which could effect CBD employment measurements (Figure 10).





FIGURE 10





### CHAPTER III

#### CBD EMPLOYMENT IN EDMONTON

This chapter will examine the characteristics of CBD Employment in Edmonton. This analysis will proceed from a general description of the growth characteristics of CBD Employment to a more specific zone by zone analysis. Several variables will be examined to determine their effect on CBD Employment: (1) population (2) general employment (3) changes in CBD functions (4) congestion and (5) parking. The summary of the Chapter will examine these variables as they apply to each individual zone comprising the CBD to determine the status of each CBD zone for future CBD Employment growth.

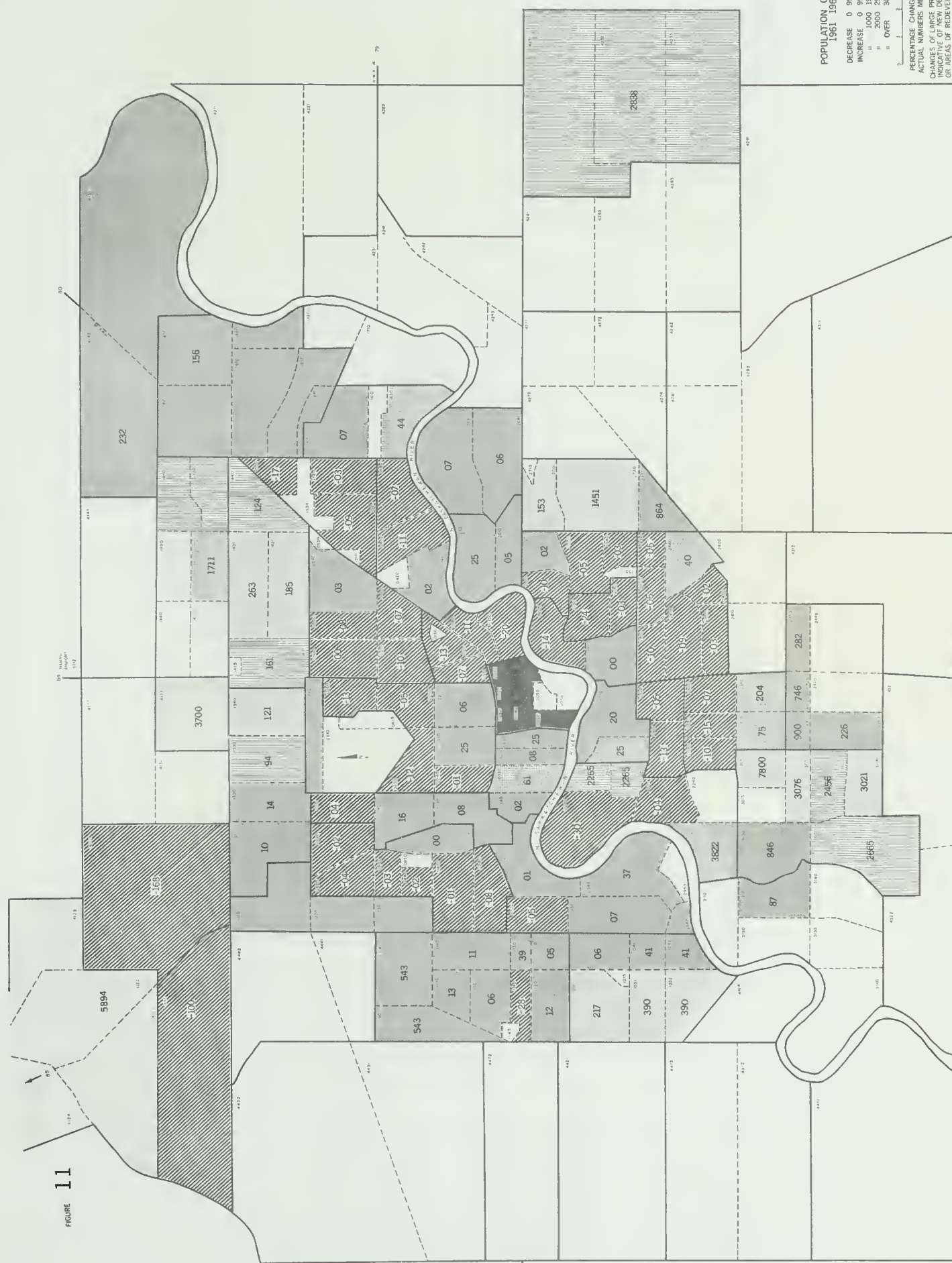
#### Edmonton's Population Change 1961 - 1967

The absolute population increase of 89,354 (Table 2) was not evenly distributed throughout the city (Appendix B). Population increases occurred in seventy traffic zones while decreases occurred in forty-seven of these zones. The general pattern of population change can be described in terms of three concentric rings: inner and outer rings which have exhibited population increases, separated by a middle ring which has exhibited a decrease (Figure 11).

The inner ring, an area immediately surrounding the CBD, is characterized by zones of population increases. This area is one of the oldest in the city (Figure 12). Because of this area's age and

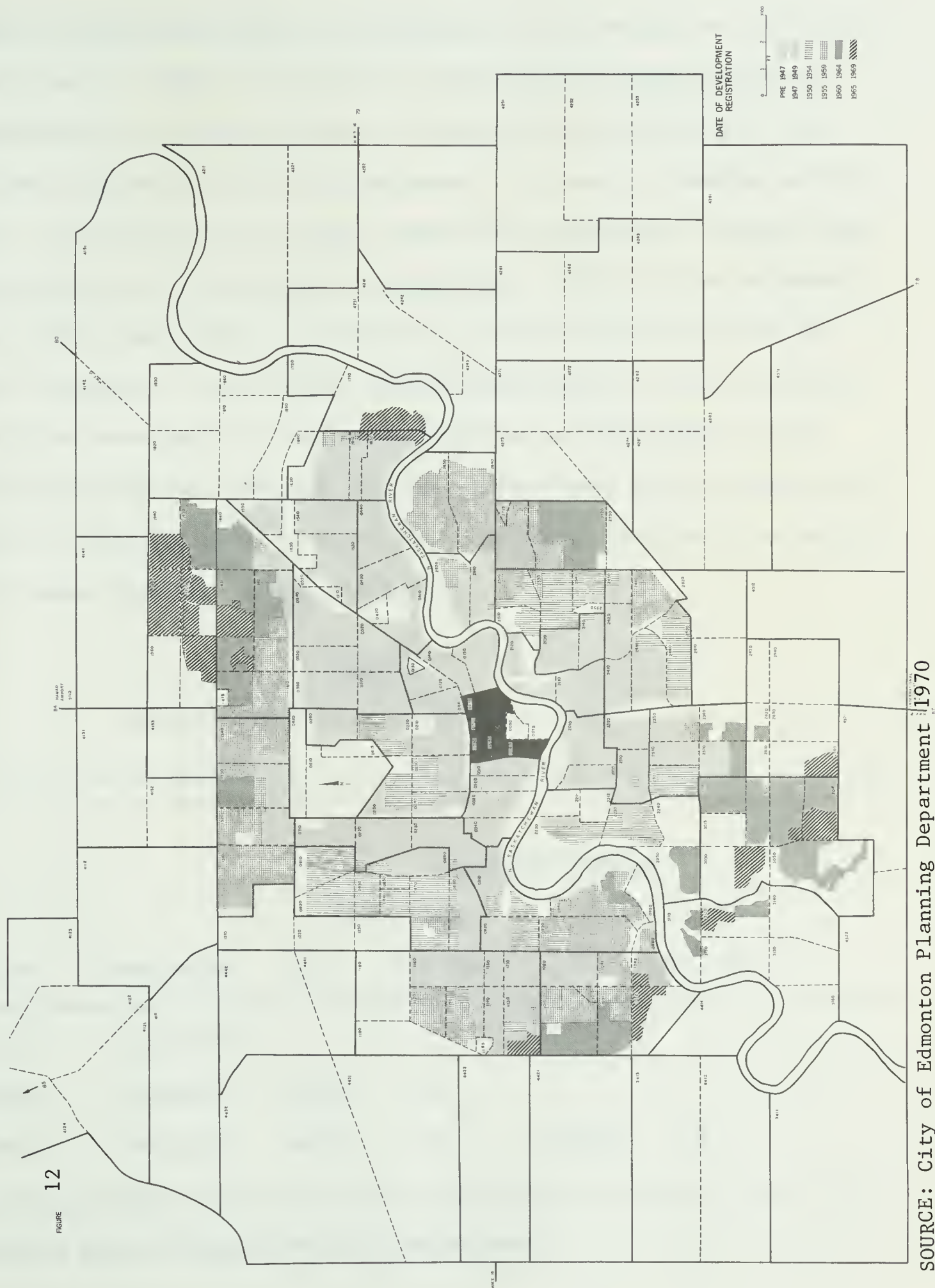






SOURCE: City of Edmonton Planning Department









and its high accessibility to the CBD it has been subject to extensive development. Walk-up and high rise apartments are being constructed resulting in a rising population. Immediately surrounding this ring is one experiencing population decrease. This area is reaching maturity (20 - 25 years) and is not quite ready for redevelopment, although many walk-ups may be found within its boundaries. Population has decreased as children have grown up and moved out leaving their parents as the sole occupants. The outermost ring is represented by newly developing suburban areas where in many cases there was no development in 1961 explaining why some rates of increase reached 3,000 per cent (Figure 11). These are obvious areas of population increase as they are characterized by younger families raising children.

TABLE 2

EDMONTON: POPULATION GROWTH 1961 - 1967

Year	Population	<u>Population Change</u>			
		1961 - 1964		1961 - 1967	
		No.	Per Cent	No.	Per Cent
1961	316,104				
1964	348,895	32,791	10		
1967	405,458	56,563	16	89,354	28

Source: City of Edmonton Planning Department



Edmonton's Employment Change 1961 - 1967

Edmonton's employment paralleled population in terms of general city growth (Table 3). Employment increases occurred in

TABLE 3

EDMONTON: EMPLOYMENT GROWTH 1961 - 1967

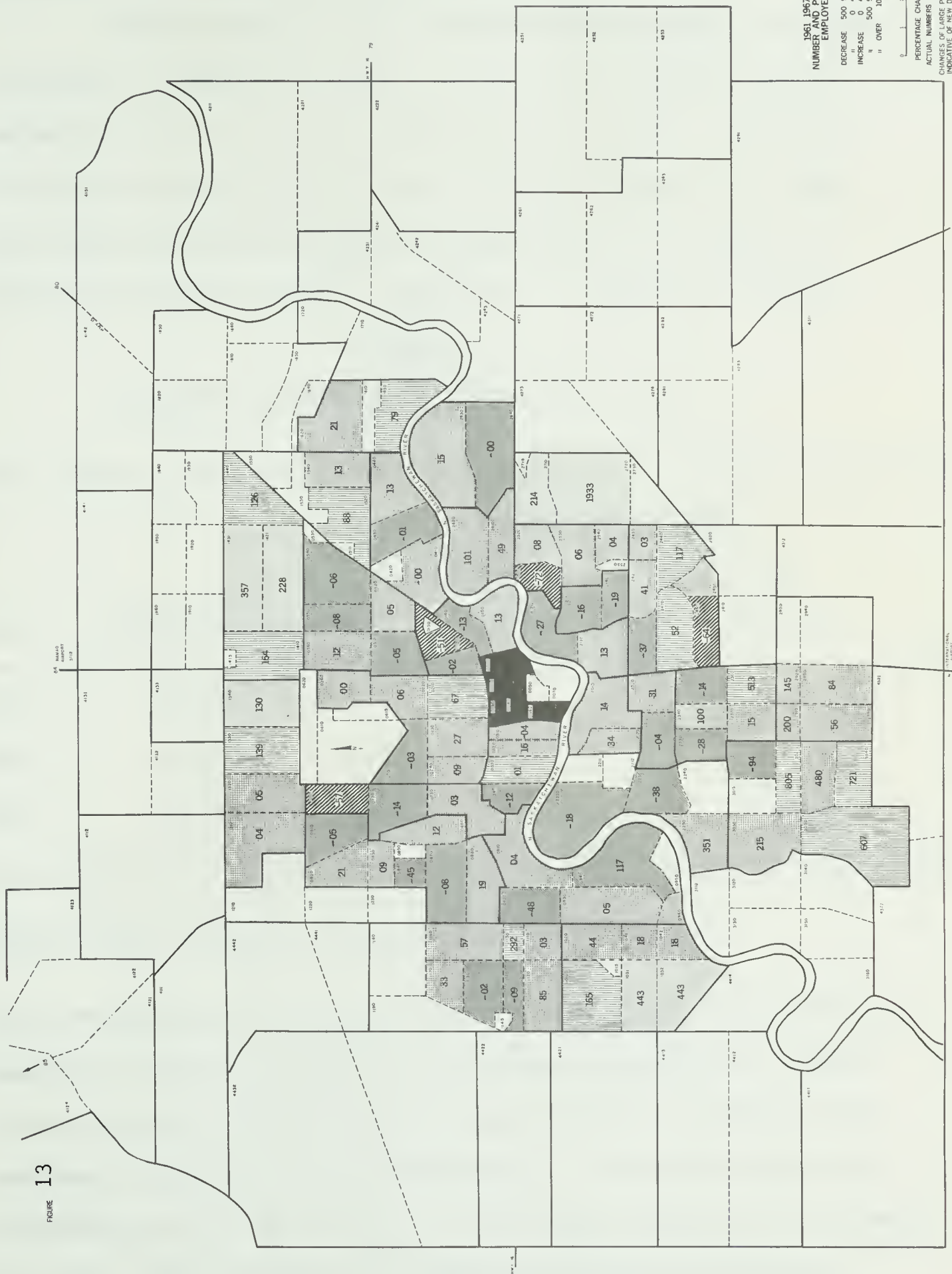
Year	Employment	<u>Employment Change</u>			
		1961 - 1964		1961 - 1967	
		No.	Per Cent	No.	Per Cent
1961	78,312				
1964	91,215	12,903	16		
1967	103,571	12,356	13	25,259	32

Source: City of Edmonton Traffic Engineering Department

seventy-three zones while only thirty zones experienced decreases (Appendix B; Figure 13). Compared with population change patterns, the concentric pattern for employment was not as pronounced, as some zones which had population decreases did not have employment decreases. This lag can be partially explained by considering the following factors. Although most of the young people have moved, some have acquired jobs and continued to reside with their parents who also may be still employed. These factors resulted in an increase in employment in these zones. The number employed will drop as these young adults move out on their own, and their parents retire.



FIGURE 13







Edmonton's CBD Employment Change 1961 - 1967

Unlike employment and population, CBD Employment exhibited no definite concentric patterns related to such factors as age of community, type of community or distance from the CBD. Nearly all the zones experienced CBD Employment decreases (Figure 14). Sixty zones experienced CBD Employment decreases while forty-three experienced increases (Table 4; Appendix B). Thirty-two of these

TABLE 4

EDMONTON: CBD EMPLOYMENT CHANGE 1961 - 1967

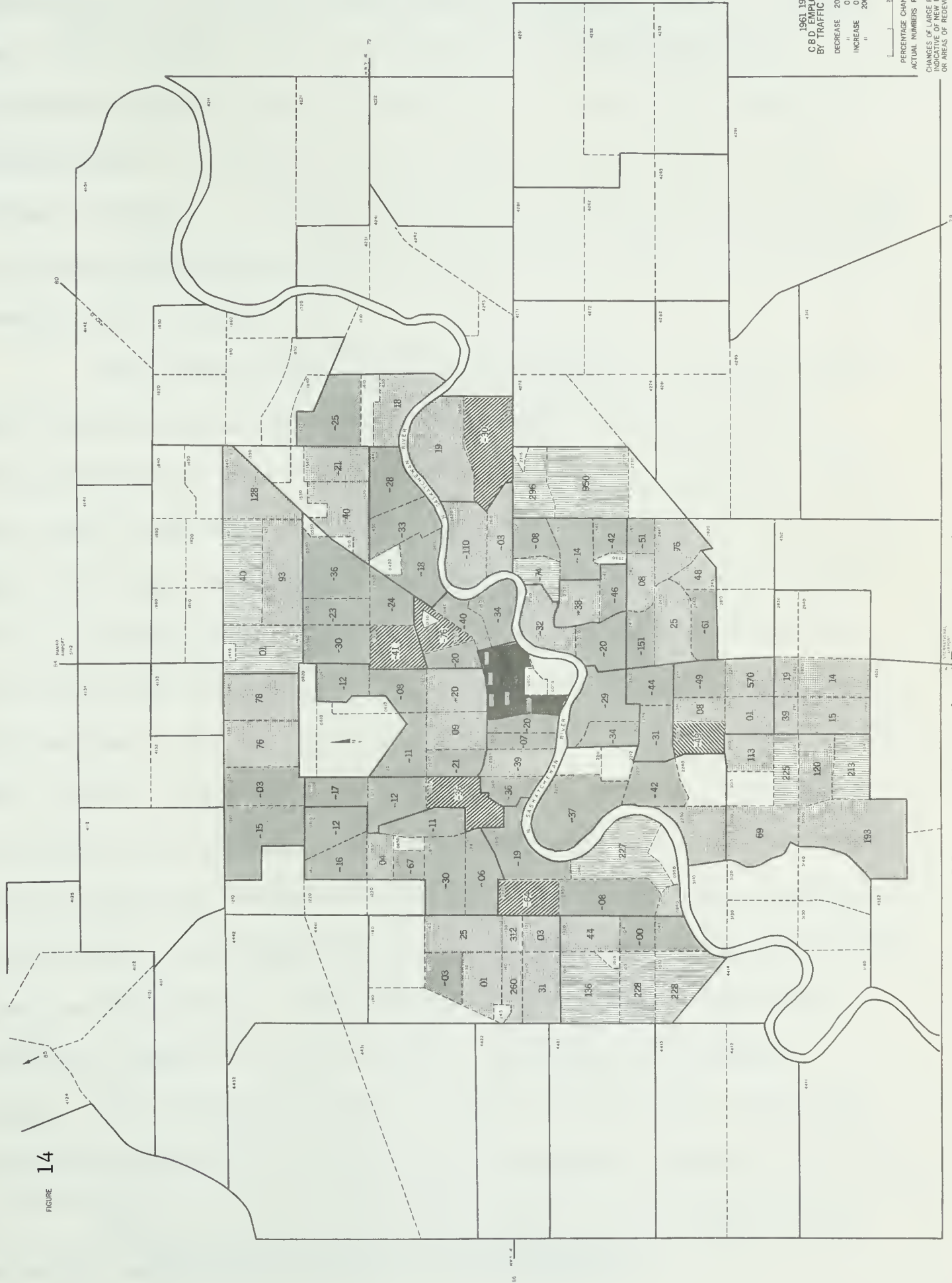
Year	CBD Employment	<u>CBD Employment Change</u>			
		1961 - 1964		1961 - 1967	
		No.	Per Cent	No.	Per Cent
1961	25,280				
1964	27,099	1,819	7		
1967	25,233	-1,866	-6	-47	No Change

Source: City of Edmonton Traffic Engineering Department

zones exhibiting CBD Employment increases also experienced significant population increases through new residential developments. Another three zones were redeveloping into zones of walk - up and high rise apartments resulting in higher populations. In two other zones the increases were only one per cent. In two zones data were not available for 1961. Thus only four of the 103 zones examined experienced a



FIGURE 14





significant CBD employment increase. (Future CBD employment will remain static or continue to decrease in established zones. However, large scale decreases will be prevented as new subdivisions are constructed thereby adding CBD workers.) The comparative growths of CBD Employment, population, and employment are illustrated on the graphs in figure 13. Although population and employment both continued to increase CBD Employment increased from 1961 to 1964, then decreased sharply in 1967 (Figure 15).

The spatial distribution of the residences of CBD employment can be generalized to some extent (Figure 16).<sup>14</sup> Two areas can be defined where more than thirty per cent of employees residing in these areas work in the CBD. These two areas are aligned with the river and have good access to the CBD. Both are fairly representative of higher socio - economic areas. There are two well - defined areas on the north and south sides of the river having an employment structure such that between twenty and thirty per cent of their employees work in the CBD. Finally, two areas housing employees for which less than twenty per cent are CBD workers are located in the north east and south east parts of the city. These two areas are situated near other employment opportunities. The south east area has ready access to new industrial zones in its vicinity. The north east area also has access to the industrial districts in north Edmonton including the industrial airport. The working population of these two areas then, has access to both the CBD and the employment areas in their immediate vicinities

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<sup>14</sup> Areas not represented by shading are those which failed to exhibit any definite patterns of CBD employment.



FIGURE 15

1961 1967  
COMPARATIVE GROWTH  
CBD EMPLOYMENT-POPULATION-GENERAL EMPLOYMENT

SOURCE : CITY OF EDMONTON ENGINEERING  
DEPARTMENT

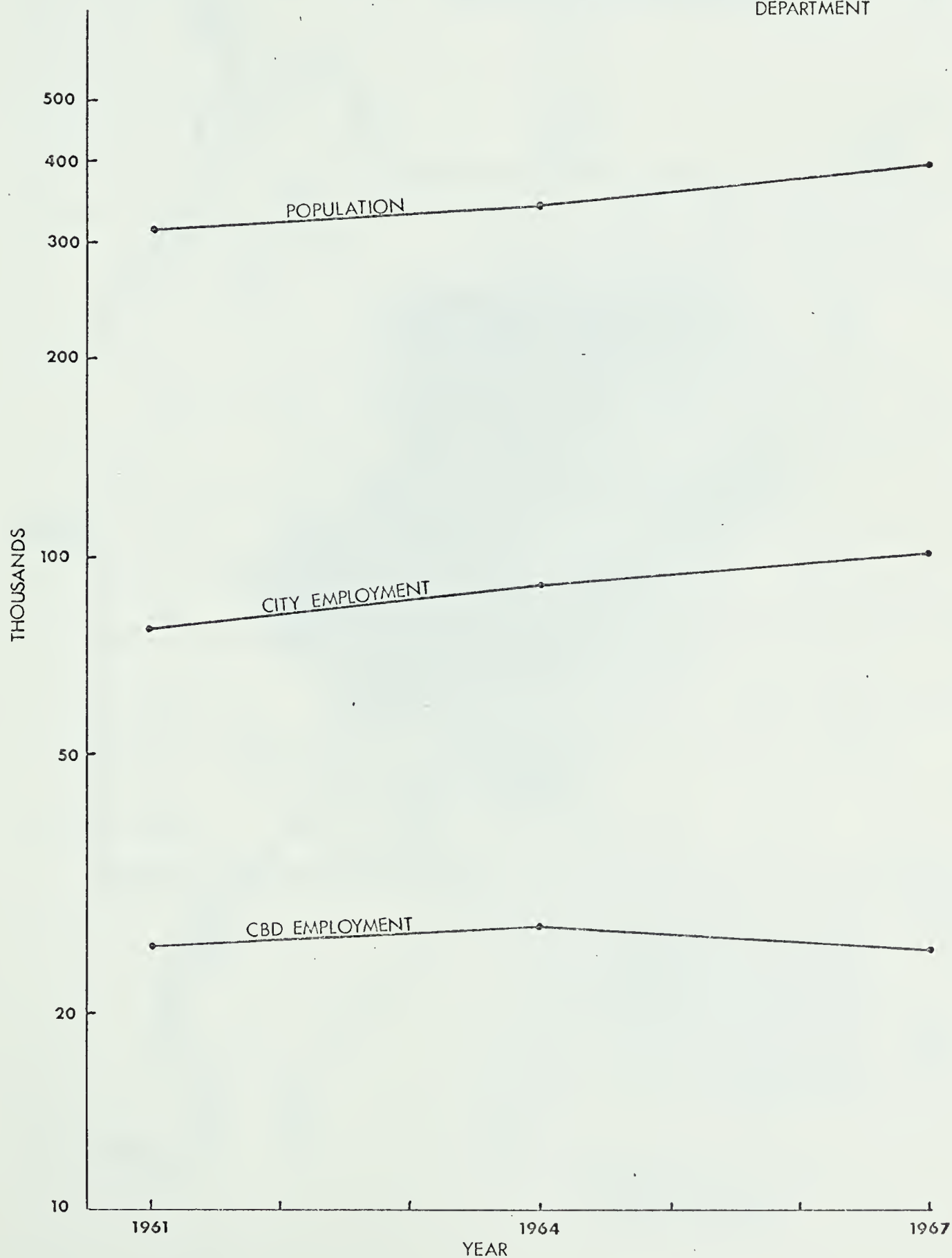
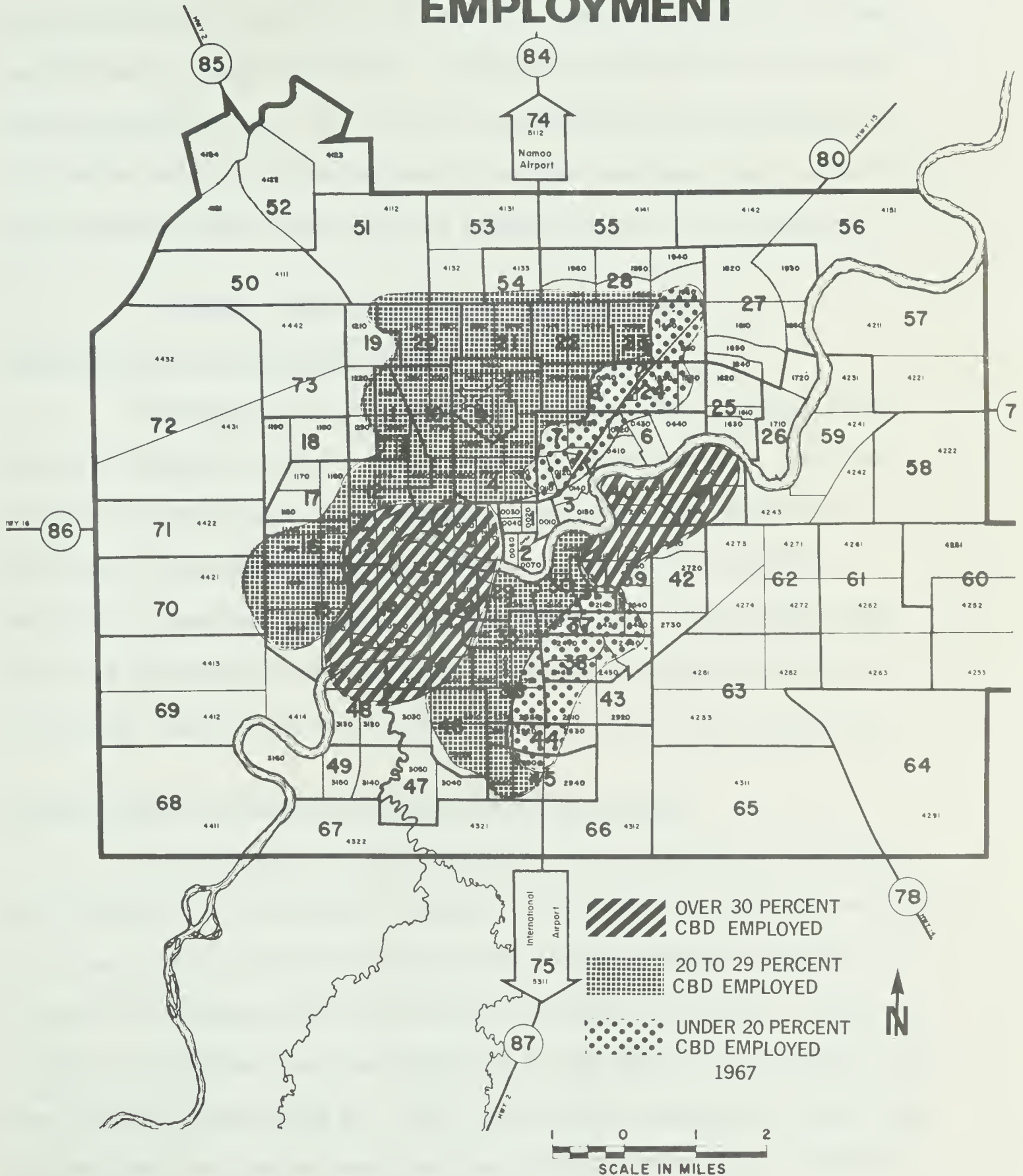






FIGURE 16

# DISTRIBUTION OF CBD EMPLOYMENT





which causes a split in their employment reducing the absolute numbers of CBD employees. (The northern area (Figure 16) distributes its employees within the CBD and the northern industrial zone, i.e., rail yards, and the light industrial - warehousing district in north west Edmonton (Figure 16). The southern area distributes its employees to the CBD as well as to the university and the southern light industrial - manufacturing areas along with the chemical plants in east Edmonton.)

#### INTERNAL CHARACTERISTICS OF CBD EMPLOYMENT

##### CBD Employment by Zone 1961 - 1967

Examination of CBD Employment to this point has emphasized city-wide characteristics. A more specific examination is required within the CBD itself. Only two zones within the CBD exhibited employment increases (Table 5). These were zones 0010 and 0060 which had a combined increase of 3,285 employees. Zones 0020, 0030, and 0040 exhibited a total decrease of 3,332 employees resulting in an overall decrease of forty-seven employees in the CBD study area.

##### Growth Characteristics of CBD Functions 1961 - 1967

To establish why CBD employment had decreased in some zones and increased in others a zone analysis of the CBD study area is required. In order to carry out this analysis CBD functions were classified (Table 6) and mapped for 1961 and 1967 (Figures 17 and 18). The total number of functions was also tabulated in the CBD as a whole (Table 7), and for each Zone (Table 8). This tabulation revealed that retailing, wholesaling, and public functions were the only functions to exhibit absolute increases (Table 7). The increase in retailing was six per



TABLE 5

## CBD EMPLOYMENT BY TRAFFIC ZONES 1961 - 1967

Zone	1961	1967	CBD Employment Change 1961 - 1967	
			No.	Per Cent
0010	8,302	10,917	2,615	31.4
0020	9,602	6,844	-2,758	-28.7
0030	1,162	854	- 308	-26.5
0040	3,162	2,896	- 266	- 8.4
0060	3,052	3,722	670	22.0
Total	25,280	25,233	- 47	no change

Source: City of Edmonton Traffic Engineering Department Research Branch

TABLE 8

## CHANGES IN CBD EMPLOYMENT, CBD FUNCTIONS, 1961 - 1967

	1961	1967	1961-67 Change		Employees per Function
			No.	Per Cent	
CBD Employment	25,280	25,233	-47	- *	(1961) 27.8
CBD Functions	910	854	-56	-6.1	(1967) 29.5

\* less than one per cent

Source: City of Edmonton Traffic Engineering Department Research Branch





TABLE 6  
CLASSIFICATION OF CBD FUNCTIONS

RETAIL					
Automobile	Food	Apparel	General	Appliance	
automobile sales tire and battery parts	grocery fruit and vegetable meat, fish, poultry candy, nuts waffle health food liquor	fur ladies wear men's wear other clothes shoes	department antique flower smoke second hand bicycle souvenir camera	variety book jewelry drug sewing gift music hobby	furniture hardware, dry goods appliances, electrical
OFFICE					
Medical		Other Professions	Financial		
physicians & surgeons physio - therapists dentists chiropractors naturopaths optometrists		veterinarians architects accountants barristers engineers	banks finance agents stock brokers real - estate agents fire insurance life insurance manufacturing agents		
SERVICE AND INDUSTRIAL					
travel agents hotels & motels restaurants cleaners hairdressers shoe repairs funeral parlors photographic studios schools of dancing ballrooms		gymnasiums bowling alleys billiard halls skating rinks theatres plumbers blacksmiths car rentals electrical repairs	ticket offices window cleaners parcel deliveries dress makers book binders lithographers & engravers sign painters radio stations ambulance service		
INSTITUTIONAL					
		churches schools and colleges hospitals			
WAREHOUSE					
		cold storage food storage lockers moving companies household storage public merchandise warehouses			
WHOLESALE					
shoes drugs florists fish and meal fruit		dry goods furniture grocery tobacco confectionery	sporting goods paper products electrical goods hardware fuel		
MANUFACTURING					
flour mills dairies printers		newspapers tent & awning tanneries	foundaries building contractors		

Source: Bannon, M. J., The Evolution of the Central Area of Edmonton, Alberta, 1946 - 1966  
Unpublished M. A. Thesis, Department of Geography, University of Alberta 1967



TABLE 7  
CBD FUNCTIONS BY ZONE 1961 - 1967

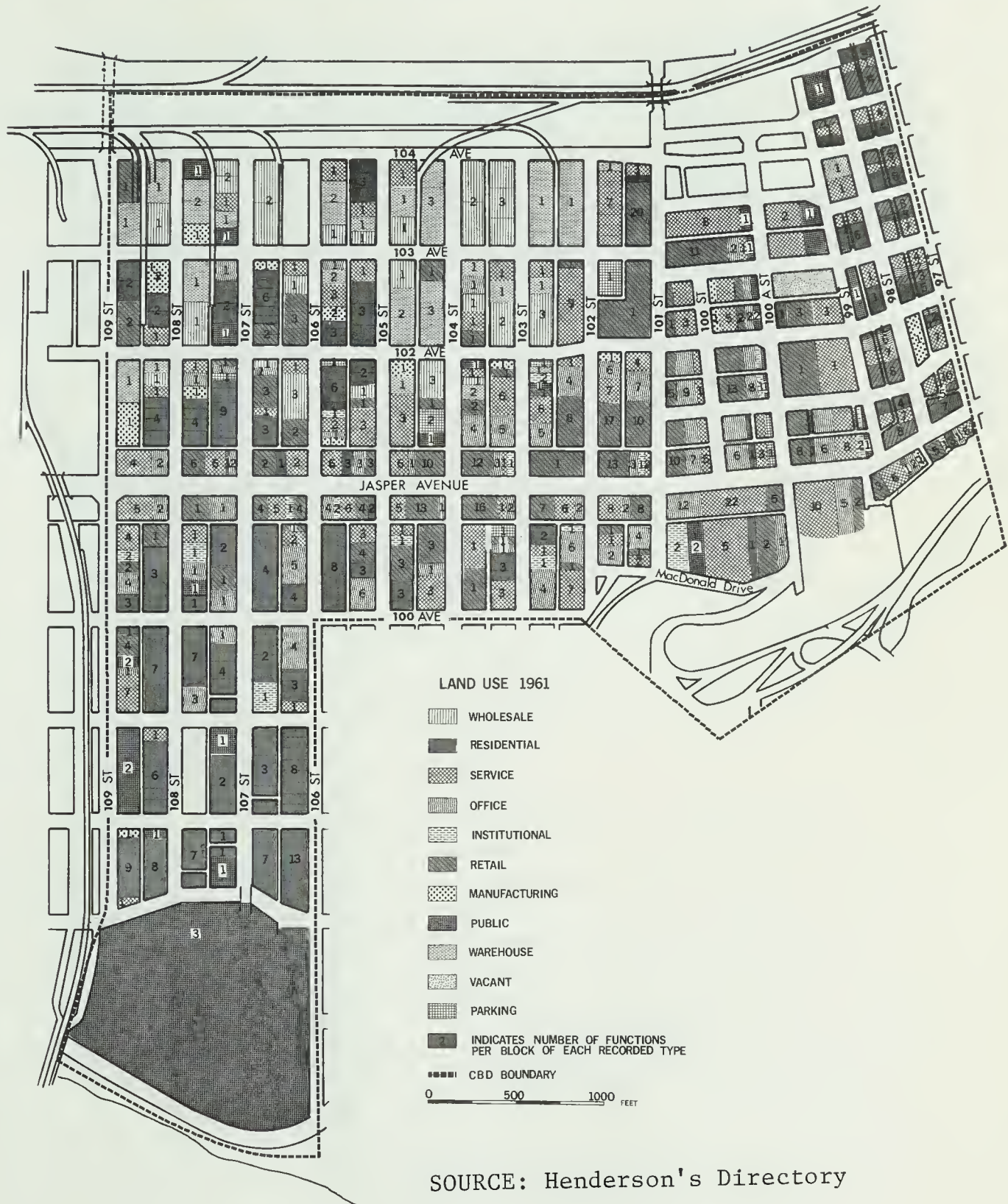
Function	ZONE 0010			ZONE 0020			ZONE 0030			ZONE 0040			ZONE 0060			CBD TOTALS		
	1961	1967	No. %	1961	1967	No. %	1961	1967	No. %	1961	1967	No. %	1961	1967	No. %	1961	1967	No. %
Retail	112	115	3 2	142	164	22 15	8	9	1 12	38	36	- 2 - 5	4	1	- 3 - 75	304	325	21 6
Wholesale	0	3	3 300	17	19	2 11	9	8	- 1 -11	6	6	0 -	0	0	0 -	32	36	4 12
Warehouse	1	1	0 -	19	15	- 4 -21	9	6	- 3 -33	2	3	1 50	0	0	0 -	31	25	- 6 -19
Service	147	129	-18	90	86	- 4 - 4	9	8	- 1 -22	53	45	- 8 -15	10	7	- 3 -30	309	275	-34 -11
Office	72	54	-18	63	48	-15 -23	2	2	0 -	36	34	- 2 - 5	9	6	- 3 -33	182	144	-38 -20
Institutional	7	3	- 4 -57	7	4	- 3 -42	0	1	1 100	7	7	0 -	1	3	2 200	22	18	- 4 -18
Public	14	11	- 3 -21	2	5	3 150	3	5	2 66	0	1	1 100	11	9	- 2 -18	30	31	1 3
Totals	353	316	-37 -10	340	341	1 -	40	39	- 1 - 2	142	132	-10 - 7	35	26	- 9 -25	910	854	-56 - 6

Source: Henderson's Directories 1961 and 1967



FIGURE 17

# THE CENTRAL BUSINESS DISTRICT OF EDMONTON



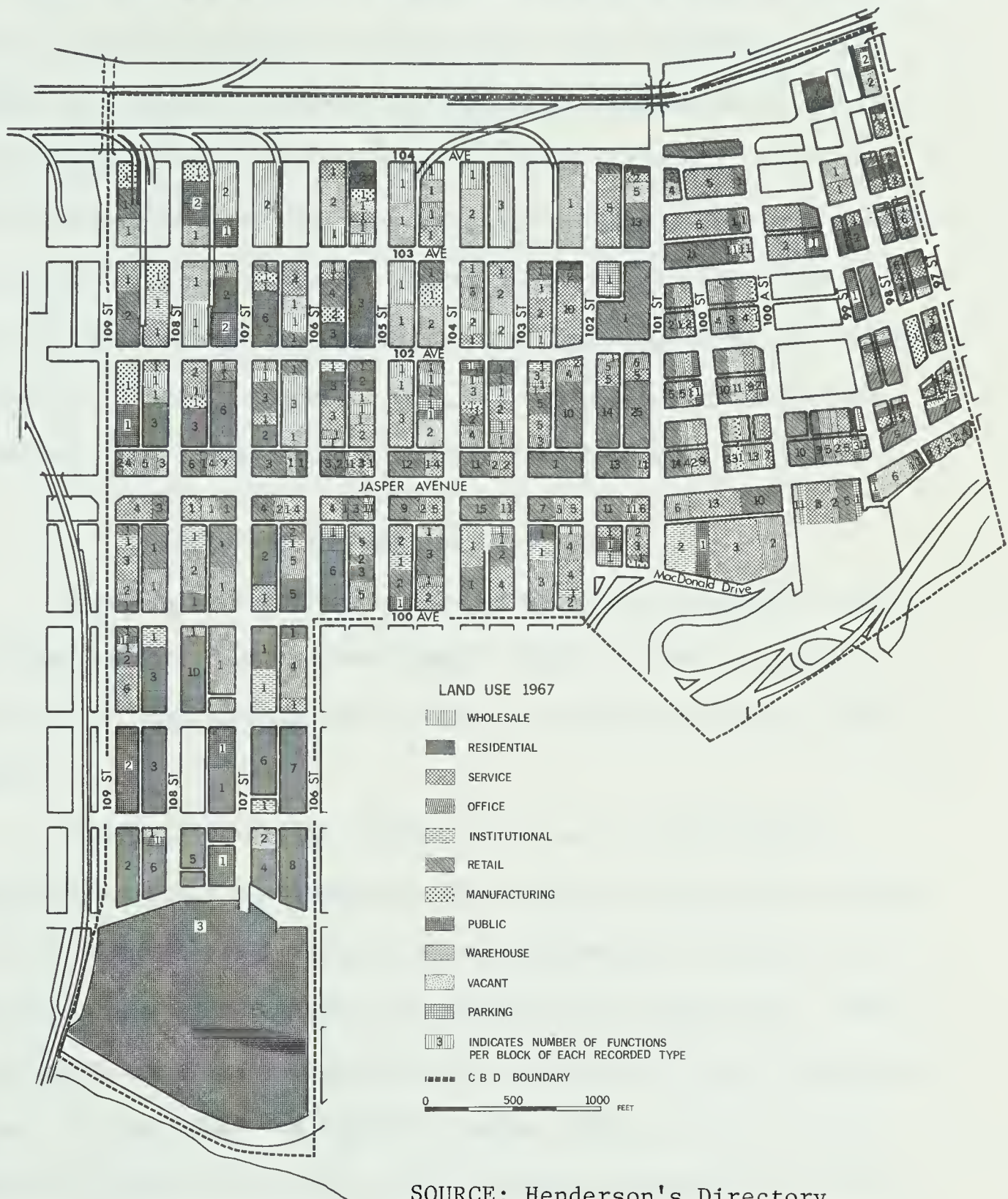
SOURCE: Henderson's Directory





FIGURE 18

# THE CENTRAL BUSINESS DISTRICT OF EDMONTON







cent, wholesaling, twelve per cent, and public, one per cent. The total number of functions decreased by five per cent from 910 in 1961 to 854 in 1967 (Table 7). This five per cent decrease in functions partially explains the decrease in CBD Employment. This decrease in functions, however, is partially compensated for by the fact that the ratio of employees to functions increased. In 1961 the ratio was 27.8 employees per function, rising to 29.5 employees per function in 1967 (Table 8). Possibly the firms with a low number of employees are moving out or the remaining firms are hiring more staff. The only immediate hope for increasing CBD Employment is that existing firms continue to hire larger numbers of employees.

#### CONGESTION AND PARKING IN THE CBD

Decreasing functions appear to be having an adverse effect on CBD Employment. Some authors (Meyer, Kain and Wohl) perceive congestion through parking and traffic, as a major deterrent to CBD growth.

Edmonton's CBD was planned for a set of technological conditions which are now outdated. Possibly the most serious problem is the ineffective separation of the various modes of traffic and associated congestion - trucks, automobiles, and pedestrians. This congestion is perceived more easily in some zones of the CBD than in others. In zones 0010 and 0020 the highest flows of vehicular and pedestrian traffic in the city are in constant competition. On the two most densely used intersections, 102 Avenue and 101 Street, and Jasper Avenue and 101 Street, the two kinds of traffic interrupt each



other impeding their free flow. The cordon count<sup>15</sup> area is synonymous with the CBD area (Figure 19). Tables 9 and 10 show the number of vehicles entering and leaving the CBD at selected times during the day. Fewer vehicles left the CBD than entered it during the study period. This may be due to an accumulation of people remaining in the CBD after 7:00 P. M.

#### Definition of Congestion

In this study the term congestion refers to streets or sidewalks which have reached their full carrying capacity. Dale Rhyason states that although the E level, congestion, has not been reached in any downtown zone, the CBD is approaching this level for the peak periods of 7:30 - 9:30 A. M. and 4:00 - 6:00 P. M.<sup>16</sup> The E level is reached when it takes more than two lights to proceed through an intersection. In 1961 the C level, a wait of one light to move through an intersection was reached in numerous locations, but by 1967 the Jasper Avenue and 102 Street intersection had exceeded this level and was approaching the D level, a wait of more than one light to move through an intersection.

#### Vehicular Traffic in the CBD

More vehicles (8,467) entered the CBD in 1967 than in 1961, a nine per cent increase (Tables 9 and 10). In 1961, 20,618 vehicles or twenty - three per cent of the total number of vehicles entering the

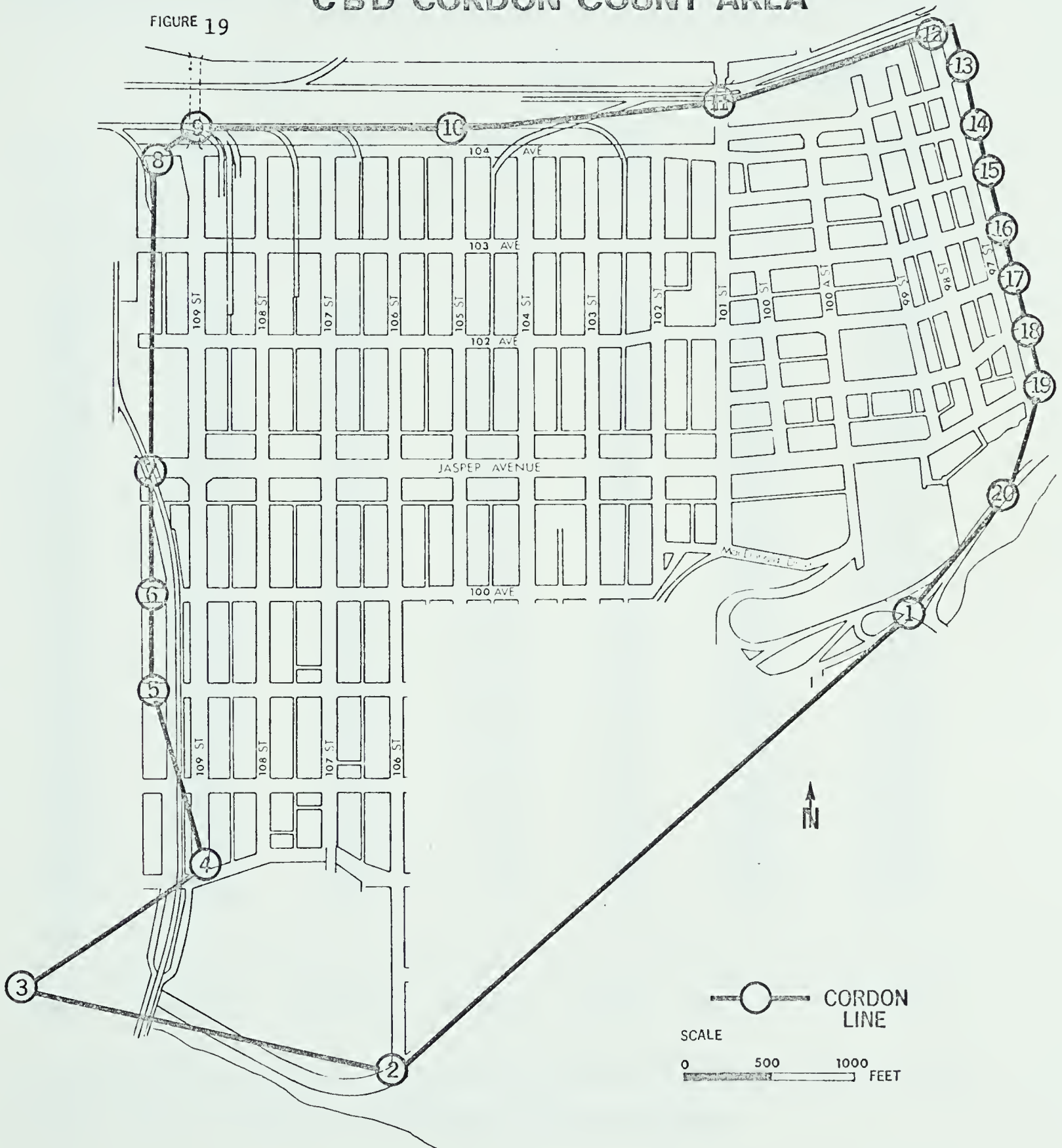
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<sup>16</sup>Personal communication, December 1971



# CBD CORDON COUNT AREA

FIGURE 19



SOURCE: City of Edmonton Traffic Engineering Department





TABLE 9

## CBD CORDON COUNT 1961

Time	CARS		TRUCKS		ALL VEHICLES	
	total in	total out	total in	total out	total in	total out
Accumulation before 7:00 A. M.						1,300
7:00	1,832	1,309	53	49	1,885	1,358
7:30	4,589	2,704	104	83	4,693	2,787
8:00	5,137	3,012	189	152	5,326	3,164
8:30	4,233	2,477	196	183	4,429	2,660
9:00	3,183	2,317	201	195	3,384	2,512
9:30	2,693	2,142	183	202	2,786	2,344
10:00	2,666	2,333	182	191	2,848	2,524
10:30	2,806	2,389	187	156	2,993	2,554
11:00	2,845	2,812	222	224	3,067	3,036
11:30	2,944	3,119	207	208	3,151	3,327
12:00	2,755	3,484	129	119	2,884	3,603
12:30	3,112	2,700	143	119	3,255	2,819
1:00	4,719	3,329	200	198	4,919	3,527
1:30	3,991	3,220	227	224	4,218	3,444
2:00	3,995	3,494	223	221	4,178	3,715
2:30	3,543	3,430	221	225	3,764	3,655
3:00	3,550	3,492	230	227	3,780	3,719
3:30	3,501	3,647	238	229	3,739	3,876
4:00	3,910	4,150	236	223	4,146	4,373
4:30	5,247	5,798	190	220	5,437	6,018
5:00	4,880	6,685	115	145	4,995	6,830
5:30	3,322	5,111	80	106	3,402	5,217
6:00	3,163	3,706	33	47	3,196	3,753
6:30	3,963	3,585	30	42	3,966	3,627
7:00						
Total	86,512	80,454	4,019	3,988	90,513	84,442

Source: City of Edmonton Traffic Engineering Department



TABLE 10

## CBD CORDON COUNT 1967

Time	CARS		TRUCKS		ALL VEHICLES	
	total in	total out	total in	total out	total in	total out
7:00	1,289	741	73	74	1,362	815
7:30	1,970	1,312	79	125	2,049	1,437
8:00	6,990	3,718	251	199	7,241	3,917
8:30	6,276	3,472	324	476	6,600	3,748
9:00	4,484	2,806	261	246	4,845	3,142
9:30	3,458	2,494	361	254	3,719	2,748
10:00	2,985	2,603	298	262	3,283	2,865
10:30	2,979	2,489	315	343	3,296	2,732
11:00	3,032	2,727	305	292	3,337	3,119
11:30	3,156	3,213	310	306	3,466	3,519
12:00	3,255	3,864	299	304	3,554	4,168
12:30	3,289	3,992	227	217	3,516	4,209
1:00	3,732	2,977	260	210	3,992	3,187
1:30	4,362	3,268	312	256	4,674	3,524
2:00	4,081	3,378	317	264	4,398	3,642
2:30	3,652	3,514	333	294	3,985	3,808
3:00	3,518	3,538	286	286	3,804	3,806
3:30	3,716	3,814	309	291	4,025	4,105
4:00	3,876	3,910	311	282	4,187	4,192
4:30	4,335	4,812	297	269	4,632	5,081
5:00	5,044	6,793	324	301	5,368	7,094
5:30	4,167	6,728	262	297	4,429	7,025
6:00	3,185	4,975	208	184	3,393	5,179
6:30	2,622	3,719	168	145	2,890	3,864
7:00	2,781	3,127	156	98	2,937	3,225
Total	94,434	88,184	6,546	5,977	98,980	94,161

Source: City of Edmonton Traffic Engineering Department



CBD arrived between 7:30 and 9:30 A.M.. By 1967, this number had increased to 24,454 or twenty-five per cent. In 1961, 26,191 vehicles or thirty-one per cent of the total number of vehicles leaving the CBD departed between 4:00 and 6:00 P. M.. By 1967 this number had increased to 28,571.

### Parking Availability

Between 1961 and 1967 there was an eighteen per cent decrease of 622 curb parking stalls in the CBD (Table 11). The government area (zone 0060) was the one which experienced a slight increase. The decrease in curb parking is directly related to the need to facilitate movement of traffic through the CBD. Because of the established grid pattern motorists can escape the major arterials and take minor routes. Because of the increased traffic between 1961 and 1967 these alternative routes have also become congested and curb parking on them has become a nuisance and in many cases has been removed.

Off-street parking has had to increase to make up the loss of available curb parking space. This resulted in a thirty-nine per cent increase in off-street parking, or a total of 3,954 stalls. This figure is quite misleading since the off-street parking increase is not distributed evenly throughout the CBD. Nearly fifty per cent (1,806 stalls) of the increase occurred in zone 0020 in the form of customer lots which are too expensive for employee parking (Table 11). There was a thirty per cent increase in the number of stalls in employee parking lots, but this does not represent a significant alleviation of employee parking difficulties. An examination of these figures show that although there has been a nine per cent increase in the number of



TABLE 11

## PARKING STALL AVAILABILITY IN THE CBD

Zone	<u>1961</u>									
	metered curb	free curb	total curb	metered lots	random	customer lots	commercial lots	private emp. lots	total offstreet	total parking
0010	678	119	797	482	62	216	1,784	178	2,722	3,519
0020	670	69	739	37	69	197	2,218	474	2,995	3,734
0030	247	228	475	0	70	72	348	445	935	1,410
0040	385	20	405	0	50	398	645	311	1,404	1,809
0050	26	407	433	0	73	155	181	185	594	1,027
0060	165	347	512	0	41	105	345	993	1,484	1,996
total	2,171	1,190	3,361	519	365	1,143	5,521	2,586	10,134	13,495
Zone	<u>1967</u>									
	metered curb	free curb	total curb	metered lots	random	customer lots	commercial lots	private emp. lots	total offstreet	total parking
0010	529	9	538	197	10	126	2,029	1,106	3,468	4,006
0020	532	76	608	55	76	2,003	710	1,555	4,399	5,007
0030	237	158	395	0	27	122	90	759	998	1,393
0040	342	1	343	0	0	239	165	1,381	1,785	2,128
0050	64	371	429	0	74	61	0	1,356	1,491	1,920
0060	153	273	426	0	149	73	0	1,725	1,947	2,373
total	1,857	888	2,739	252	336	2,624	2,994	7,882	14,088	16,827

Source: City of Edmonton Traffic Engineering Department.





TABLE 12  
PARKING RATIO 1961 - 1967

Year	Vehicles Entering		Parking Ratio
	the CBD	Available Stalls	Parking Stalls/Vehicle
1961	90,513	13,495	.149
1967	98,980	16,827	.170

Source: City of Edmonton Traffic Engineering Department

vehicles and a twenty-four per cent increase in the number of parking stalls, the problem of employee parking in the CBD has not been relieved. The parking ratio has increased (Table 12).

Continuing problems of the decreasing number of CBD functions, the increasing number of vehicles, and a shortage of employee parking appear to be affecting Edmonton's CBD. These problems could possibly be used to explain changing employment patterns in the CBD.

#### THE EFFECT OF CONGESTION AND PARKING AVAILABILITY ON CBD EMPLOYMENT

Because of the apparent significance of congestion and parking availability additional information was needed to illustrate their effect on CBD employment. Two analyses were carried out: (1) a comparison of the ratios of vehicles to CBD employees for 1961 and 1967; and (2) a comparison of the ratios of parking stalls to CBD employees for 1961 and 1967. The ratio of vehicles to employees increased (Table 13). This increase suggests that the CBD is becoming more inaccessible and therefore less attractive for employment.



TABLE 13

## CBD VEHICLE RATIO 1961 - 1967

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Year	CBD Employees	Vehicles	Vehicle Ratio
			Vehicle/CBD Employee
1961	25,280	90,531	3.58
1967	25,233	98,980	3.99

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Source: City of Edmonton Traffic Engineering Department

This increased congestion could make work locations in suburban areas a possibility for many CBD employees and employers.

Parking Ratio: Parking Stalls Per CBD Employee 1961 - 1967

Closely related to congestion is the problem of employee parking. In determining the number of stalls available to employees, the results of a post card passout survey in 1961 (Stanley, Grimble, Roblin Ltd. and Barton Aschmann Association, 1962) were used.<sup>17</sup> The post cards were placed on all cars parked in zones 0010, 0020, 0030, and 0040 during the peak parking accumulation period of 2:00 P. M. to 3:00 P. M. asking the reason for parking, the final destination of the parker, and the length of stay. Thirty-six per cent of the cards were returned. The usage of parking stalls by employees is shown in Table 14. The ratio of parking stalls by employees increased over the six year period from .323 to .434 (Table 15). Although there was an

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<sup>17</sup>Stanley, Grimble, Roblin Ltd., Metropolitan Edmonton Transportation Survey Data Report: Cordon Count, Edmonton 1962.



TABLE 14

## CBD EMPLOYEE PARKING STALL AVAILABILITY

CBD Parking	Per Cent Available to CBD Employees
Metered Curb	19
Free Curb	81
Random and Offstreet Lots	69
Private and Employee Lots	92
Average 65.5	

Source: City of Edmonton Traffic Engineering Department

TABLE 15

## RATIO OF PARKING STALLS AVAILABLE TO CBD EMPLOYEES 1961 - 1967

Parking Ratio: Stalls/CBD Employee						
Zone	Employees	Stalls	1961 Ratio	Employees	Stalls	1967 Ratio
0010	8,302	2,145	.258	10,917	2,756	.252
0020	9,602	2,359	.245	6,844	3,556	.519
0030	1,162	979	.842	854	1,039	1.216
0040	3,162	1,130	.357	2,896	1,616	.558
0060	3,052	1,564	.512	3,722	1,989	.534
Total	25,280	8,177	.323	25,233	10,956	.434





increase there was still less than one half stall per CBD employee in 1967. Lack of Parking facilities, like traffic congestion may be a deterrent to CBD Employment.

SUMMARY: CBD EMPLOYMENT BY ZONE 1961 - 1967

Zone 0010

Zone 0010 experienced a 31.4 per cent increase in its employment (Table 5). Except for retailing and wholesaling every function exhibited a decrease in their numbers between 1961 and 1967. The zone suffered an absolute decrease of thirty - seven functions (Table 7).

The increases in retailing and wholesaling are not sufficient to account for the 31.4 per cent increase (2,615 new CBD employees in the zone). Retail establishments increased by three as did wholesale establishments. A closer examination reveals the reason for this increase and the area of the zone in which this increase occurred. The land use examination of functions considered only ground floor usage. In the area west of 99 Street high rise construction occurred in which most of the upper floors were devoted to office uses. This explains why ground floor usage of office functions decreased; they were moving from their original ground floor locations to the upper levels of the new office structures. This also explains why retailing functions increased; new stores were opened on the ground floors of these new structures. This growth in zone 0010 will continue to attract new CBD employees because it has been designated CC (Civic Centre).



Although certain streets of zone 0010 have already reached the D level of vehicular occupancy and are fast approaching the E level CBD employment has continued to increase. Parking availability for CBD employees had decreased making parking even more difficult (Table 15). This suggests either that employees are willing to cope with these problems or that they are using other modes of transportation. The latter is possible, since the transit (thirty-seven out of the city's fifty routes) service is excellent to this area of town (Figure 8). Perhaps more people are utilizing car pools, or a combination of car pools and transit. In conclusion the point of congestion which could cause a decrease in CBD employment in zone 0010 has not been reached. Therefore, congestion has not affected growth in zone 0010.

#### Zone 0020

This zone experienced a 28.7 per cent decrease in employment from 9,602 in 1961 to 6,844 in 1967 or a drop of 2,758 employees (Table 5). The number of functions in zone 0020 totalled 340 in 1961 but dropped to 331 in 1967 a decrease on nine (Table 7). Of the seven listed functions only retailing and public showed an increase. Retailing increased from 142 to 164 functions. This increase would have little influence on the number of jobs available because it would be represented by small specialty shops employing very few workers. Public functions increased by three. The most likely explanation for the employment decrease is the decrease in office functions which are labour intensive because of their propensity for clerical staff. The new office construction in zone 0010 probably drew office functions from this zone reducing



the number of CBD employees here. As in zone 0010 parking and vehicular congestion have not affected the employment changes. Between 1961 and 1967 parking availability increased from 2,359 to 3,445 stalls from .245 stalls per employee to .519 stalls per employee (Table 15). Apparently parking difficulties have not contributed to the employment decrease and in fact may have prevented a greater loss. Traffic is between the C and D levels so the streets are not yet congested. Thirty-three of the City's fifty bus routes pass through zone 0020 helping to alleviate the traffic problems (Figure 8).

Employment could conceivably continue to decrease in the zone. The structures housing the remaining office, warehouse - wholesale, and retail functions will continue to age. Since the area is zoned CM and C - 4 (Appendix A) there will be no significant office construction bringing in more employees. Because major retail growth will occur in new suburban centres retail functions will remain in small stores thus limiting the growth potential here. The northern portions of the zone will continue in wholesale - warehousing (Figure 10) and little or no growth can be expected in this already low - labour area. In conclusion, zone 0020 will likely experience little or no significant growth in CBD employment potential in the near future, unless rezoning is allowed for office construction.

#### Zone 0030

Zone 0030 experienced a decrease in employment from 1,162 in 1961 to 854 in 1967 (Table 5). This absolute decrease of 308 (26.5 per cent) was the second highest in the CBD study area. An examination of zone 0030 reveals a minimal number of functions; forty in 1961 and





thirty-nine in 1967 (Table 7). This decrease in the number of functions is not significant enough to explain the 26.6 per cent loss of employees. The most logical reasons could be derived from the description of zone 0030 in Chapter two. The zone contains some of the oldest structures in the city. These wholesale - warehouse establishments were built for a past era. They are multi-storied structures designed to be serviced by rail; hence, their contiguous location to the C. N. and C. P. rail lines. They could draw on the immediate population which surrounds the zone for employees. Technology has caused a drastic change in the type of structure now demanded for wholesale - warehouse functions. Truck transport replaced rail as the distributor of goods primarily because of its versatility. Conveyor systems for handling goods demanded single story structures, but the cost of land in the inner city made the construction of such structures prohibitive. These factors then, have resulted in the deterioration of the present structures reducing the attractiveness of the zone to new functions. In the near future functions located in zone 0030 probably will consider terminating operation or moving to the suburbs where a modern plant meeting today's standards can be erected. As mentioned in Chapter two, the zone's position of accessibility by rail is now a hindrance. Since the zone is bordered on the north and west by tracks, heavy trucks are forced to navigate downtown vehicular traffic.

Zoned CM, (Appendix A; Figure 9) other functions are unlikely to locate in the zone. Retailing would have a difficult time justifying such a move and public functions appear to be established in zone 0060.





Traffic is not a reason for decreased employment for congestion is lowest in zone 0030. Parking is the best in the CBD with an increase from .842 stalls per employee in 1961 to 1.216 stalls per employee in 1967 (Table 15). Although transit service is poor (Figure 8) the zone is accessible to the automobile with ample parking.

The explanation for the decrease in employment seems to be related to the decrease in attractiveness and the isolation of the zone due to changing technology and zoning.

#### Zone 0040

Zone 0040 also experienced a decrease in employees from 3,162 in 1961 to 2,896 in 1967 (Table 5). This loss of 266 employees represents a 8.4 per cent decrease. An analysis of the functions found within the zone might disclose the reasons for this loss. There were 142 functions in 1961 but only 122 in 1967, a decrease of twenty (Table 7). Every function suffered a decrease except for warehousing which increased from two to three establishments, not a significant enough increase to alter the numbers employed. Again congestion cannot be cited as a cause for the decrease. The level E had not been reached and even the 109 Street and Jasper Avenue intersection does not display a serious traffic problem even at the morning and afternoon peak periods. The number of parking stalls available to employees rose from 1,130 or .357 stalls per employee to 1,616 or .558 stalls per employee (Table 15). Bus and trolley service to the zone is more than adequate to handle any problems of congestion which might arise in the coming years (Figure 8).



Pedestrian traffic is too low in the zone to support a large retail sector along Jasper Avenue. The numerous automobile dealerships with their large tracts of open space are not conducive to pedestrian movement. These factors could be altered if new office buildings develop in the zone with their ground floors devoted to retail - service functions as occurred on the north side of Jasper Avenue between 108 and 109 Street which now has a heavy pedestrian flow. The C - 4 and C - 3 zoning could ensure this change (Figure 9, Appendix A).

That the city centre is moving in this direction is another consideration. This factor could increase the attractiveness of the zone, possibly halting the decrease in employment or increasing the employment. The main reason for the drop in employment in zone 0040 therefore is the lowered number of work - providing functions. The zone is not close enough to the major portions of the CBD. Again, congestion, parking and vehicular, does not effect the situation.

#### Zone 0060

Zone 0060 like 0010 experienced an increase in CBD employment. Between 1961 and 1967 the number of employees grew from 3,052 to 3,722, a twenty-two per cent increase (Table 5). The total number of functions decreased from thirty-five to twenty-six over the same six year period (Table 7). Every function except institutional exhibited a decrease. The institutional functions increased from one to three establishments, accounting for some of the increase. Although public functions decreased from eleven to nine, the major public employers, the federal and provincial governments, remained



in the same locations. These establishments are quite large, covering entire blocks. To handle increased governmental business and responsibility a significant number of new employees were likely hired over the six year study period. Apparently congestion has had little or no influence on CBD employment in this zone either. Zone 0060 does not suffer from the E level congestion even at the peak hours. The D level may be reached at some intersections for a short time during the two peak periods. Access to the zone is gained from three points in the city via 105 Street from the south, 109 Street from the north and south, and Jasper Avenue and the River Road from the west. Employee parking increased from 1,564 stalls or .512 stalls per employee in 1961 to 1,989 stalls or .534 stalls per employee in 1967 (Table 15). The latter ratio is one of the highest in the CBD. Transit service is not sufficient, with only two routes servicing the zone (Figure 8).

The north east portion of the zone has been zoned R - 7 and should therefore provide more retail - service functions thereby increasing the number of employees. The 109 Street section in the north west has been zoned C - 6 and could likely maintain its own position relative to employees (Appendix A; Figure 9).

The public functions have been largely responsible for the rising number of employees in zone 0060. Future increases will likely depend on the expansion of this sector. Congestion as in all other CBD zones does not appear to be a significant factor in CBD employment change.





## CHAPTER IV

### SUMMARY AND CONCLUSIONS

This thesis has examined changes in Edmonton's CBD employment for the years 1961 to 1967. An examination of these changes was accomplished by studying those internal and external factors which could have effected CBD employment.

A careful summary of literature pertaining to CBD morphology and methods of delimitation was reviewed to become better acquainted with the nature of Central Business Districts and the problems involved in determining their boundaries. Emphasis was then placed on delimiting the Edmonton Central Business District and identifying its characteristics by zone. Changes in population, general employment, CBD functions, and vehicular congestion and parking were examined to determine their effect on CBD employment.

The central areas of cities exhibit regular patterns of activities and land uses which are distributed in definable areas (peak-value intersection, core, frame and transition zone). There is some disagreement as to where the boundaries of these areas begin and stop but within the areas there is a general acknowledgement that they do constitute the central areas of cities. Knowing that each of these areas constituting the central cities are unique in their own way it is hard to understand why little thought has been given to employment in these areas.



Edmonton's CBD morphology is also characterized by a peak-value intersection, core - frame, and transition zone similar to Central Business Districts elsewhere. Like other CBDs, exact boundaries are difficult if not impossible to define.

Established methods of CBD delimitation are inadequate if the aim of urban geographers is to find a method of delimitation which can be used on a comparative basis from city to city. Geographers should consider whether or not an arbitrary boundary is just as beneficial. There is valid reason to question the need for universality in delimiting CBD boundaries. The purpose of this thesis was to examine the nature of CBD employment in Edmonton and provide information which is seriously lacking in this field. The CBD boundary was then selected to best suit this purpose. Because of its individual morphological character no universal technique for delimitation could be applied to Edmonton's CBD for comparative purposes. The problem of delimitation, for universal comparison, is further complicated, as each city is unique in the manner in which it collects and disseminates data, not to mention the type of data available; Edmonton is no exception. These were factors which had to be considered in delimiting the CBD in order to study employment. One conclusion of this thesis is that a universal method of CBD delimitation is unrealistic. All comparative studies on different Central Business Districts should be approached with a degree of caution. CBD delimitation should be accomplished to suit the purpose of the study and best equate the available data.

It is more accurate to state that this thesis delimits an area in central Edmonton which includes the CBD and an undefined area on the



fringe of this district. Therefore, the term, "CBD" refers, in this study, to this larger area, as most studies of the CBD should.

The CBD boundary as determined by the Traffic Engineering Department offered the best solution to the problems of delimitation. This boundary allows for the changes which occur over time due to the shifting nature of the CBD thus making it satisfactory in examining CBD employment over a six year period. This delimitation also corresponds to the boundaries for which data is available. Also, the study area was divided into six zones during the METS Study allowing for a finer analysis of the Edmonton CBD as data was available for each zone. Analysis has shown that each zone is characterized by its own problems and individuality which could effect CBD employment measurements.

Which might appear to be a significant characteristic for the entire area of the CBD might be uncharacteristic for any one of its parts. Traffic congestion, employment characteristics, changes in functions must be viewed by small individual areas not as an aggregate. The smaller the area the more decisive the results. This is my major criticism of CBD studies. Most studies do not realize that the whole is merely the sum of the parts and that each part may be quite different from the whole. This is especially true in examining CBD employment in Edmonton. It was hypothesized that increased vehicular traffic, poor parking availability, decreased numbers of functions and deterioration of structures effected CBD employment. This appeared true for the whole CBD, but individual zones revealed different characteristics.

During the study period Edmonton experienced a significant increase in population and employment. The general pattern of population





change can be described in terms of three concentric rings: inner and outer rings which have exhibited population increases, separated by a middle ring which has exhibited a decrease. The inner ring, an area immediately surrounding the CBD, is characterized by zones of population increases. This area is one of the oldest in the city. Because of this area's age and its high accessibility to the CBD it has been subject to extensive development. Walk-up and high-rise apartments are being constructed resulting in a rising population. Immediately surrounding this ring is one experiencing population decrease. This area is reaching maturity (20 - 25 years) and is not quite ready for redevelopment, although some walk-ups may be found within its boundaries. Population has decreased as children have grown up and moved out leaving their parents as the sole occupants. The outermost ring is represented by newly developing suburban areas where in many cases there was no development in 1961 explaining why some rates of increase reached such high levels. These are obvious areas of population increase as they are characterized by younger families raising children.

Edmonton's employment paralleled population in terms of general city growth. Employment increases occurred in seventy-three zones while only thirty zones experienced decreases. Compared with population change patterns, the concentric pattern for employment was not as pronounced as some zones which had population decreases did not have employment decreases. This lag can be partially explained by considering the following factors. Although most of the young people have moved some have acquired jobs and continued to reside with their parents. Also their parents are still employed. These two factors resulted in an increase in employment in these zones. The number employed will drop as these young adults move out on





their own, and their parents retire.

Unlike employment and population, CBD employment exhibited no definite concentric patterns related to such factors as age of community, type of community or distance from the CBD. Nearly all the zones experienced CBD employment decreases. All zones exhibiting CBD employment increases also experienced significant population increases through new residential developments. This suggests that CBD employment can continue to increase only through new residential development to offset CBD employment losses in established communities. Although population and employment both continued to increase CBD employment increased from 1961 to 1964, then decreased sharply to 1967. Therefore geographers cannot expect to use population and employment growth characteristics as indicators of CBD employment growth.

A patterned dispersion can be identified for the spatial distribution of those employed in the CBD. More than thirty per cent of the working population of two definite areas are employed in the CBD. There are two well-defined areas on the north and south sides of the river which attract between twenty and thirty per cent of their working population to the CBD for employment. Finally, two explicit areas employing less than twenty per cent CBD workers are located in the north east and south east of the city.

To establish why CBD employment has decreased, a zone by zone analysis of the CBD study area was required. Bannan's classification for CBD functions was utilized to delimit their spatial distribution and effect on CBD employment. Results revealed that retailing, wholesaling, and public functions were the only functions to exhibit absolute increases.



It may be concluded that the growth characteristics of CBD employment and CBD functions are similar, allowing geographers to use figures on CBD functions as indicators of CBD employment change. Examining the CBD as a whole revealed that there had been a significant increase in the total number of vehicles entering and leaving the CBD between 1961 and 1967, and that congestion was therefore increasing and apparently making it more difficult to move about in the CBD. This reinforced the hypothesis that as traffic increases the CBD becomes less and less attractive as a place of employment. Between 1961 and 1967 there was also an increase in the number of parking stalls in the CBD but this increase was not sufficient to alleviate a shortage. Therefore it appeared that parking was adversely effecting CBD employment.

Continuing problems of the decreasing number of CBD functions, the increasing number of vehicles, and a shortage of employee parking appear to be effecting Edmonton's CBD employment. These problems could possibly be used to explain changing employment patterns in the CBD. However, a zone by zone analysis was responsible for a modification of these hypotheses. It was concluded that each zone and sections within these zones exhibited their own individual characteristics. It was found that on a zone by zone analysis traffic congestion could not be considered a deterrent to CBD employment expansion as was also the case with parking availability. It was also concluded that it was not only the number of functions in the CBD which was important but also the type which could influence the nature of employment. Zoning, deterioration of existing structures, accessibility must also be examined when reviewing changes in CBD employment.



This analysis allowed me to reach three general conclusions:

- (1) Present means of delimiting CBDs are totally inadequate.

The CBD is an extremely heterogenous area which must be broken into as many study areas as possible if geographers are to obtain any degree of accuracy in their CBD studies. Large all-encompassing generalizations just cannot be made about Central Business Districts. More work should be undertaken to understand the internal characteristics of the CBD and less on the dubious work of universal delimitation. Central Business Districts must be delimited for the purpose at hand.

- (2) The importance of CBD employment studies has generally been ignored. More work is needed in this area of study to enhance the understanding of our Central Business Districts.
- (3) The future of CBD employment lies in the ability to attract the office functions to the CBD environs. If this is accomplished, the many ancilliary functions will follow along with their employees.

Geographers should consider a detailed analysis of 1971 Civic Census data relative to the various factors which were used to analyse CBD employment in this thesis. This would provide a decade of employment data and a more reliable indication of the trends which might occur in Edmonton's CBD. This analysis is especially desirable because of the high-rise office construction in Edmonton's CBD since 1967. To analyse this data the CBD must be divided into more zones relative to their functions. Block by block characteristics of the CBD are too diverse to rely on five zones as used in this thesis.

In general, geographers must realize the importance of CBD employment characteristics if they are to understand the nature of change in the CBD.





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## APPENDICES



APPENDIX A  
ZONING REGULATIONS<sup>1</sup>

R-7 RESIDENTIAL AND SPECIAL PURPOSE OFFICE DISTRICT

General Purpose:

The general purpose of this District is to provide land for high density residential uses and for special purpose offices and other uses which are appropriate and compatible having regard to the particular location of this District. Densities for non-residential uses are relatively low and adequate off-street parking is necessary.

(1) Permitted Uses:

Those uses listed as "permitted uses" within the R-5 Medium Density Residential District. The following uses are also permitted:

Apartment hotels, hotels and motels	
Clinics, including drug stores where access is obtained from the lobby of the building	
Eating establishments, excluding drive-in establishments	
Institutions of a religious, philanthropic or educational nature	
Limited convenience retail services primarily accessory to the serving the needs of the district	
Museums and art galleries	Private clubs and lodges
Fire stations	Public and quasi-public
Offices	buildings
Police stations	Schools, private and public

(2) Regulations:

- (a) Regulations Governing Residential Uses: For all residential uses within this District the regulations governing R-6 High Density Residential Districts shall apply.

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<sup>1</sup>The City of Edmonton Land Use Classification Guide.



## APPENDIX A

(b) Regulations Governing Non-Residential Uses:

- (i) Floor Area Ratio: The ratio of floor area to site area shall not exceed 3 : 1.
- (ii) Site Area: Site area shall be not less than 66 feet frontage and an area of 8,600 square feet for any purpose designed non-residential building.

## (iii) Yards:

Front yard: Minimum 20 feet.  
Side yard: Minimum 10 per cent of lot width.  
Rear yard: Minimum 25 feet.

- (c) Regulations Governing Mixed Uses: In any building containing both residential and non-residential uses, no residential use shall be permitted on the main floor except in the case of accommodation primarily for transient use.
- (d) Conflict of Regulations: Where, in the opinion of the Development Control Officer, the strict application of the regulations will adversely affect residential amenities, either on the subject site or surrounding properties, he shall refuse the development.





## APPENDIX A

C-3 GENERAL COMMERCIAL DISTRICTGeneral Purpose:

The general purpose of this District is to provide sites at appropriate locations for service, supplies, storage and specialized sales uses where the retail character has been largely lost. Some uses may have adverse effects upon residential and retail commercial properties and it is necessary to exercise adequate control over such uses.

(1) Permitted Uses:

Those permitted uses listed in Section 4 (1) of this schedule for C-2A Commercial District.

(2) Regulations:

The regulations governing the C-2A Commercial District shall apply to the C-3 General Commercial District excepting that the maximum height permitted may be increased by the Development Control Officer, where, in his opinion, such increase will not adversely affect adjacent properties.

(3) Special Permit Uses:

Those Special Permit Uses listed in Section 4 (3) of this schedule for C-2A Commercial District

Auctioneering establishments (open)  
Building material sales  
Building material storage  
yards, but only in conjunction with building material sales  
Equipment sales and service  
Plumbing, heating and gas fittings sales and service  
Trailer Sales and rentals.



## APPENDIX A

C-4 CENTRAL RETAIL AND OFFICE DISTRICTGeneral Purpose:

The general purpose of this district is to serve as the most intensively developed and compact centre for retail shopping and general office activities and to provide for various and extensive entertainment, dining, meeting and other appropriate facilities and to encourage large scale site and building development to modern standards, including integrated parking, pedestrian facilities, plazas, arcades and consolidated loading facilities.

(1) Permitted Uses:

Those listed as "permitted uses" and "special permit uses" within the C-2A Commercial District. The following uses are also permitted:

Advertising signs (design manufacture and repair)	Machinery sales within a building
Ballrooms	Motels and motor hotels
Blue printing and photostating	Plumbing, ventilating and heating equipment and gas fitting, sales and service establishments
Bookbinding and map mounting	Production and repair of art metal work, clothing, cus- tom manufacturing and al- terations for retail only, jewellery from precious metals, watches, dentures and optical lenses
Building material storage yards in conjunction with the sale of building material	Publishing and printing
Contractors' plants and storage yards	Radio and television broad- casting
Electrical contractors	Trade schools, including mu- sic, dancing and business schools, and beauty culture schools
Engraving, art (photo, elect- ronic, manplate and jewellery)	
Laboratories, including medical dental and testing	
Lithographers	
Self-serve and automatic laundries	
Tires retail, repaired and servicing	



## APPENDIX A

(2) Regulations:

- (a) Yards: There are no yard requirements except in the following cases:
  - (i) Where a side yard is provided it shall be not less than 3 feet in width.
  - (ii) If dwelling units, rooming units, hotel and motor hotel sleeping rooms have windows facing any interior lot lines side yards shall be provided in accordance with the requirements of the R-6 High Density Residential District.
- (b) Floor Area Ratio: The ratio of gross floor area to net site area shall not exceed 6 : 1 provided that where any or all of the following features are provided the floor area ratio may be increased proportionately, as determined by the Development Control Officer:
  - (i) special pedestrian facilities, such as arcades, plazas, street-level setbacks and parking terminal connections, and having regard to adequate weather protection,
  - (ii) consolidated parking and loading facilities,
  - (iii) the consolidation of lots into large parcels, and
  - (iv) the setback of buildings above the main and second storey level,

provided that no individual development shall exceed an F. A. R. of 10 :1.

In determining the value of the above facilities the Officer shall pay due regard to purpose and intent of Chapter X of the City General Plan.

(3) Special Permit Uses:

Equipment rentals (open)  
 Parking garages (Not accessory)  
 Public garages.



## APPENDIX A

C-6 GOVERNMENT AND OFFICE DISTRICTGeneral Purpose:

The general purpose of this District is to provide for the orderly and economical development of land primarily for Federal and Provincial legislative and administrative functions and for uses associated therewith without infringing on the rights of individuals except to the extent that is necessary for the greater public interest.

(1) Permitted Uses:

Government offices	Public and quasi-public
Government uses other than	buildings
offices where normally appropriate to provide for the	Public parks
legislative and administrative	Public utility buildings and
functions of government	installations
Business, administrative and	Fire stations
professional offices and	Parking lots
banks	Police stations
Parking garages, private and	Post Offices
public	Public libraries

(2) Regulations:

The regulations governing the C-4 Central Retail and Office District shall apply to the C-6 Government and Office District with the exception that off-street parking shall be determined in accordance with the provisions of the Zoning Bylaw.





## APPENDIX A

CM - WHOLESALE DISTRIBUTION DISTRICTGeneral Purpose:

The general purpose of this district is to serve as the primary location for wholesale sales, storage and distribution activities in the Government Centre or office core.

(1) Permitted Uses:

Those uses listed as "permitted uses" within the C4 Central Retail and Office District. The following uses are also permitted:

Automobile body shops	Ornamental iron works
Bakery	Parking garages
Bottling works	Public garages
Building material suppliers	Sheet metal and tinsmith shops
Bulk oil sales	Taxidermists
Cabinet making	Trailer sales and rentals
Equipment rentals (open)	Trailer repairs and servicing
Express companies	Truck terminals
Freight truck lines	Vending machine repairs and servicing
Furniture moving	Warehousing, wholesale and accessory
Hatcheries	Welding Shops
Metal Plating	
Manufacture of figurines and similar ceramic products, musical instruments, toys, novelties, rubber and metal stamps, dairy products, light sheet metal products, primarily for heating and ventilating equipment.	

(2) Regulations:

The regulations governing the CM-Wholesale Distribution District shall be the same as those governing the C-2A Commercial District, excepting that the maximum height may be increased to 100 feet.



## APPENDIX A

CC - CIVIC CENTRE DISTRICTGeneral Purpose:

The general purpose of this District is to serve as the actual and symbolic civic and community centre for the City and to contain administrative buildings and related compatible uses and containing, amongst other things, hotel and meeting facilities.

(1) Permitted Uses:

Government offices as herein defined, namely, a municipal office, court house, registry office, health and welfare centre, employment offices or other office use for purposes of local or other government administration.

Government uses other than offices, where normally appropriate, to provide for the legislative and administrative functions of government.

Business, administrative and professional offices and banks

Clinics

Public parks

Fire stations

Public and quasi-public

Libraries

buildings

Museums

Public parking garages

Police stations

Public utility buildings and installations

Retail stores

(2) Regulations:

The regulations governing C-4 Central Retail and Office Districts shall apply to CC-Civic District or an otherwise may be modified or varied by the provisions of any Development Scheme Bylaw which may be applied to this CC-Civic Centre District.

(3) Special Permit Uses:

Those uses listed as "permitted uses" or "special permit uses" within the C-4 Central Retail and Office District where not included under Section (1) hereof.



APPENDIX B   POPULATION BY TRAFFIC ZONE

ZONES	1961	1964	1967	POPULATION CHANGE 1961-1967	%
0010		1,336	1,124		
0020					
0030		790	922		
0040	6,746				
0050		2,179	2,983		
0060		1,133	1,190		
0070		1,486	1,515		
0110	4,305	4,142	3,996	- 309	- .07
0120	4,626	4,284	3,994	- 632	- .13
0130	-	-	-		
0140	3,320	3,280	2,946	- 374	- .11
0150	4,629	4,043	3,695	- 934	- .20
0210	3,936	3,969	4,184	248	.06
0220	3,207	2,797	3,027	- 180	- .05
0230	3,573	3,082	4,489	916	.25
0240	782	796	769	- 13	- .01
0250	2,357	2,059	2,021	- 298	- .12
0260	3,162	2,634	2,747	- 415	- .13
0310	2,406	2,595	3,025	619	.25
0320	2,391	2,342	2,597	206	.08
0330	1,951	2,286	3,160	1,209	.61
0340	2,012	2,049	2,067	55	.02
0410	2,581	2,529	2,638	57	.02
0420					
0430	3,577	3,417	3,164	- 413	- .11
0440	3,866	3,702	3,546	- 302	- .07
0510	7,106	6,606	6,379	- 727	- .10
0520	5,620	5,476	5,209	- 411	- .07
0530					
0540	4,125	3,971	4,270	145	.03
0550	2,866	2,714	2,633	- 233	- .08
0560	5,359	5,447	5,331	- 28	- .00
0610					
0615					
0620					
0710	2,582	2,445	2,466	- 116	- .04
0720	4,628	4,984	5,409	781	.16
0730	4,495	4,828	4,874	379	.08
0810	4,512	4,368	4,396	- 116	- .02
0820	3,853	3,851	3,678	- 175	- .04
0830	2,532	2,566	2,441	- 91	- .03
0840	672	627	652	- 20	- .02





## APPENDIX B

ZONES	1961	1964	1967	POPULATION CHANGE 1961-1967	%
0850					
0860	4,110	4,115	4,130	20	.00
0870	5,511	5,307	5,411	- 100	- .01
0880	4,991	4,704	4,544	- 447	- .08
0910	2,139	2,117	2,169	30	- .01
0920	3,243	3,119	3,062	- 181	- .05
0930	5,079	6,111	5,461	382	.07
0940	2,529	2,688	3,479	950	.37
0950					
0960			600	600	
1010	2,289	5,127	7,276	4,987	2.17
1015					
1020	3,942	4,133	4,193	251	.06
1031					
	1,387	4,098	6,801	5,414	3.90
1032					
1041					
	2,106	3,461	2,977	871	.41
1042					
1110	2,499	2,529	2,642	143	.05
1120	2,767	2,938	3,113	346	.12
1130	777	745	1,087	310	.39
1140	1,325	1,079	947	- 378	- .28
1145					
1150	3,948	4,219	4,207	249	.06
1160	4,777	5,044	4,332	555	.11
1170	3,329	3,442	3,794	465	.13
1180					
			543	543	.543
1190					
1210					
1220			32	32	
1230					
1310	7,863	8,595	8,709	846	.10
1320	5,340	5,942	6,102	762	.14
1330	3,005	4,731	5,848	2,843	.94
1340	3,204	6,904	7,097	3,893	1.21
1410	1,750	4,106	4,575	2,825	1.61
1415					
1421	3,028	6,855	8,641	5,613	1.85
1431	1,968	2,713	7,155	5,187	2.63
1440	2,089	3,197	4,689	2,600	1.24
1510					
1520	5,066	4,698	4,564	- 502	- .09
1530					



## APPENDIX B

ZONES	1961	1964	1967	POPULATION CHANGE 1961-1967	%
1540	3,426	3,352	3,293	- 133	- .03
1550	230	213	190	- 40	- .17
1610					
1620	5,300	5,678	5,678	378	.07
1630	3,640	5,242	5,242	1,602	.44
1710					
1720					
1810					
1820	Northeast				
1830	(Casselman	157	156	156	
1840	Clareview				
1850	Hermitage)				
1860					
1910					
1920			1,711	1,711	
1930			2,463	2,463	
1940					
1950					
1960					
SOUTHSIDE					
2010	3,514	3,507	4,239	725	.20
2020	3,989	3,716	4,999	1,010	.25
2110	6,036	5,797	6,071	35	.00
2120	1,710	1,625	1,461	- 249	- .14
2130	3,745	3,277	2,819	- 926	- .24
2140	2,344	2,186	2,260	- 84	- .03
2211			2,265	2,265	
2212					
2220	2,577	1,894	1,796	- 781	- .30
2230	4,081	3,942	3,894	- 187	- .04
2240					
2250	40	973	1,569	1,529	38.22
2310	4,672	4,142	4,057	- 615	- .13
2320	2,303	2,242	2,169	- 134	- .05
2330	3,752	3,477	3,376	- 376	- .10
2340	2,981	2,865	2,528	- 453	- .15
2350	1,772	1,683	1,635	- 137	- .07
2360	871	2,028	2,656	1,785	2.04
2370	1,433	2,885	2,520	1,087	.75
2410	3,122	3,010	2,785	- 337	- .10
2420	2,792	2,658	2,612	- 180	- .06
2430	2,612	2,508	2,448	- 164	- .06
2440	2,567	3,670	3,603	1,036	.40



## APPENDIX B

ZONES	1961	1964	1967	POPULATION CHANGE 1961-1967	%
2450	1,524	1,466	1,489	- 35	- .02
2460	3,509	3,487	3,382	- 127	- .03
2470	5,311	5,010	4,818	- 493	- .09
2510	2,784	2,665	2,504	- 280	- .10
2520	3,091	2,950	3,159	68	.02
2530	4,945	4,870	4,652	- 293	- .05
2540	2,267	2,258	2,179	- 88	- .03
2550					
2610	3,453	3,541	3,627	174	.05
2620	2,235	2,768	2,814	579	.25
2630	5,139	5,479	5,548	409	.07
2640	7,432	7,797	7,880	448	.06
2710	2,035	4,374	5,168	3,133	
2715					
2720	677	6,865	10,502	9,825	14.51
2730				864	
2810					
2820					
2910			900	900	
2920			746	746	
2930			282	282	
2940					
2950					
2960			226	226	
3010	17	2,365	3,046	3,026	178.00
3015					
3021			3,076	3,076	
3022			2,456	2,456	
3030			846	846	
3040			3,021	3,021	
3050			2,665	2,665	
3110					
3120			87	87	
3130					
3140					
3150					
3160					
4111	100			- 100	
4112	168			- 168	
4121					
4122	St. Albert	8,247	9,940	5,894	
4123	4,046				
4124					
4131	B.A.C.M.				
4132					
4133	3,700			3,700	



## APPENDIX B

ZONES	1961	1964	1967	POPULATION CHANGE 1961-1967	%
4141					
4142	232			232	
4151					
4211					
4221					
4222					
4231					
4241					
4242					
4243					
4251					
4252	2,838			2,838	
4253					
4261					
4262					
4263					
4271					
4272					
4273					
4274					
4281					
4282					
4283					
4291					
4311	SEDA				
4312					
4321	Kaskiteeo				
4322					
4411					
4412					
4413	West Jasper Place				
4414					
4421					
4422					
4431					
4432					
TOTAL	316,104	348,895	405,458	89,354	28





APPENDIX B EMPLOYMENT BY TRAFFIC ZONE

ZONE	1961	%	1964	%	1967	%	CHANGE 1961-1967	%
0010								
0020								
0030								
0040								
0050								
0060								
0070								
0110	720	17	650	16	643	16	- 17	- .02
0120	1,160	25	1,046	24	568	14	- 592	- .51
0130								
0140	800	24	569	17	692	23	- 108	- .13
0150	777	17	764	19	879	24	102	.13
0210	930	24	1,357	34	1,560	34	630	.67
0220	840	26	820	29	896	30	56	.06
0230	1,540	43	1,244	40	1,971	44	431	.27
0240	240	31	278	35	262	34	22	.09
0250	760	32	799	39	731	36	- 29	- .03
0260	850	27	857	33	857	31	7	.00
0310	1,000	42	872	34	1,040	34	40	.04
0320	920	50	1,068	46	1,069	41	149	.16
0330	660	34	880	38	1,330	42	670	1.01
0340	690	34	716	35	602	29	- 88	- .12
0410	590	23	615	24	592	22	2	.00
0420								
0430	980	27	901	26	966	31	- 14	- .01
0440	970	25	1,166	31	1,101	31	131	.13
0510	2,020	28	1,952	30	1,902	30	- 118	- .05
0520	1,450	26	1,553	28	1,527	29	77	.05
0530								
0540	1,100	27	1,337	34	1,033	23	- 67	- .06
0550	780	27	876	32	712	24	- 68	- .08
0560	1,440	27	1,193	22	1,613	30	173	.12
0610								
0615								
0620								
0710	1,720	67	718	29	731	30	- 989	- .57
0720	1,600	35	1,740	35	1,369	25	- 231	- .14
0730	1,454	32	1,350	28	1,509	31	55	.03
0810	1,230	27	1,280	29	1,160	26	- 70	- .05
0820	1,030	27	245	6	1,248	34	218	.21
0830	660	26	652	25	721	30	61	.09
0840	140	21	241	38	77	12	- 63	- .45



## APPENDIX B

ZONE	1961	%	1964	%	1967	%	CHANGE 1961-1967	%
0850								
0860	1,390	34	1,110	27	1,563	38	173	.12
0870	1,570	28	1,558	29	1,436	27	-- 134	-- .08
0880	1,330	27	1,520	32	1,584	35	254	.19
0910	510	24	602	28	533	25	23	.04
0920	820	25	913	29	419	14	-- 401	-- .48
0930	1,540	30	1,592	26	1,629	30	89	.05
0940	360	14	656	24	783	23	423	1.17
0950								
0960					176	29	176	
1010	520	23	1,216	24	1,378	19	858	1.65
1015								
1020	870	22	862	21	1,260	30	390	.44
1031	290	21	998	24	1,577	16	1,287	4.43
1032								
1041	450	21	343	10	533	18	83	.18
1042								
1110	610	24	158	6	629	24	19	.03
1120	510	18	734	25	944	30	434	.85
1130	200	26	196	26	185	17	585	2.92
1140	220	17	426	39	200	21	-- 20	-- .09
1145								
1150	880	22	920	22	858	20	-- 22	-- .02
1160	840	18	808	16	1,327	25	487	.57
1170	830	25	684	20	1,107	29	277	.33
1180								
1190								
1210								
1220								
1230								
1310	1,910	24	2,332	27	1,998	23	88	.04
1320	1,240	23	1,853	31	1,304	21	64	.05
1330	560	19	1,347	28	1,304	22	780	1.39
1340	880	27	2,004	29	2,025	29	1,145	1.30
1410	440	25	1,281	31	1,163	25	723	1.64
1415								
1421	610	20	1,915	28	2,006	23	1,396	2.28
1431	370	19	735	27	1,692	24	1,322	3.57
1440	450	22	827	26	1,019	22	569	1.26
1510								
1520	1,090	22	1,390	30	2,052	45	962	.88
1530								
1540	880	26	1,060	32	996	30	116	.13
1550								
1610								
1620	840	16	1,335	24	1,022	18	182	.21
1630	880	23	1,207	23	1,579	30	699	.79



## APPENDIX B

ZONE	1961	%	1964	%	1967	%	CHANGE 1961-1967	%
1710								
1720								
1810								
1820	Northeast							
1830	(Casselman							
1840	Clareview							
1850	Hermitage)							
1860								
1910								
1920								
1930								
1940								
1950								
1960								
2010	930	26	866	25	1,066	25	136	.14
2020	1,060	27	884	24	698	14	362	.34
2110	1,740	29	1,713	30	1,969	32	229	.13
2120	460	27	403	25	335	23	-125	- .27
2130	850	23	1,171	36	709	25	-141	- .16
2140	580	25	555	25	469	21	-111	- .19
2211								
2212								
2220	480	19	374	20	392	22	- 88	- .18
2230	1,030	25	735	19	760	20	-295	- .28
2240								
2250			171	18	351	22	351	
2310	1,381	30	1,125	27	1,321	33	- 60	- .04
2320	600	26	634	28	414	19	186	.31
2330	1,410	38	969	28	1,007	30	-403	- .28
2340	370	12	899	31	743	29	373	1.00
2350	420	24	469	28	358	22	- 62	- .14
2360	130	15	452	22	797	30	667	5.13
2370	400	28	752	26	461	18	61	.15
2410	1,200	38	971	32	747	27	-453	- .37
2420	720	26	653	25	1,019	39	299	.41
2430	630	24	736	29	649	27	19	.03
2440	550	21	1,025	28	1,195	33	645	1.17
2450			413	28	153	10	153	
2460	920	26	1,063	30	479	14	-594	- .64
2470	1,100	21	1,300	26	1,681	35	581	.52
2510	740	27	678	25	204	8	-536	- .72
2520	780	25	833	28	849	27	69	.08
2530	1,290	26	1,361	28	1,374	30	84	.06
2540	620	27	754	33	645	30	25	.04
2550								
2610	770	22	961	27	1,154	32	384	.49
2620	460	21	840	30	926	33	466	1.01





## APPENDIX B

ZONE	1961		1964		1967		CHANGE 1961-1967	
		%		%		%		%
2630	1,240	24	1,337	24	1,472	27	232	.18
2640	1,890	25	2,053	26	1,886	24	- 4	.00
2710	470	23	1,285	29	1,711	33	1,241	2.64
2715								
2720	150	22	1,791	26	3,050	29	2,900	19.33
2730								
2810								
2820								
2910					200	22	200	
2920					145	30	145	
2930								
2940								
2950					84	32	84	
2960					56	25	56	
3010			668	28	574	19	- 94	
3021					805	26	805	
3022					480	20	480	
3030					215	25	215	
3040					721	24	721	
3050					607	23	607	
3110								
3120								
3130								
3140								
3150								
3160								
4111								
4112								
4121								
4122	St. Albert				2,998			
4123								
4124								
4131	B.A.C.M.							
4132								
4133								
4141								
4142								
4151								
4211								
4221								
4222								
4231								
4241								
4243								
4251								
4252	Sherwood Park							
4253								



## APPENDIX B

ZONE	1961		1964		1967		CHANGE 1961-1967	
		%		%		%		%
4261								
4262								
4263								
4271								
4272								
4273								
4274								
4281								
4282								
4283								
4291								
4311	SEDA							
4312								
4321	Kaskiteeo							
4322								
4411								
4412								
4413	West							
4414	Jasper Place							
4421								
4422								
4431								
4432								
TOTAL	78,312	24	91,215	26	103,571	25	25,259	32



APPENDIX B      CBD EMPLOYMENT BY TRAFFIC ZONE

ZONE	#1961	%	#1964	%	#1967	%	CHANGE		%
							1961-1967		
0010									
0020									
0030									
0040									
0050									
0060									
0070									
0110	210	29	175	27	167	26	- 43	-	.20
0120	430	38	226	22	100	18	- 330	-	.76
0140	310	39	211	37	186	27	- 124	-	.40
0150	350	45	301	39	229	26	- 121	-	.34
0210	400	43	495	36	481	31	- 81	-	.20
0220	220	26	235	29	202	23	- 18	-	.08
0230	580	38	466	37	637	32	57		.00
0240	90	38	92	33	71	27	- 19	-	.21
0250	200	26	222	28	178	24	- 22	-	.11
0260	230	27	267	31	201	23	- 29	-	.12
0310	460	46	424	49	367	35	- 93	-	.20
0320	480	52	472	44	446	42	- 34	-	.07
0330	340	52	361	41	475	36	135		.39
0340	340	49	318	44	217	36	- 123	-	.36
0410	240	41	226	37	195	33	- 45	-	.18
0420									
0430	390	40	302	34	261	27	- 129	-	.33
0440	480	49	395	34	342	31	- 138	-	.28
0510	630	31	575	29	368	19	- 262	-	.41
0520	470	32	473	30	353	23	- 117	-	.24
0530									
0540	290	26	273	20	184	18	- 106	-	.36
0550	190	24	199	23	145	20	- 45	-	.23
0560	540	38	367	31	373	23	- 167	-	.30
0610									
0615									
0620									
0710	180	10	194	27	149	20	- 31	-	.17
0720	430	27	541	31	378	28	- 52	-	.12
0730	690	47	541	40	440	29	- 250	-	.36
0810	320	26	361	28	281	24	- 39	-	.12
0820	350	34	72	29	292	23	- 58	-	.16
0830	180	27	223	34	188	26	84		.44
0840	70	50	94	39	23	30	- 47	-	.67
0850									
0860	410	29	349	31	363	23	- 47	-	.11



## APPENDIX B

ZONE	#1961	%	#1964	%	#1967	%	CHANGE 1961-1967	%
0870	540	34	499	32	373	26	- 167	- .30
0880	510	38	623	41	479	30	- 31	- .06
0910	300	59	306	51	243	46	- 57	- .19
0920	380	46	337	37	116	28	- 246	- .64
0930	580	38	595	37	533	33	- 47	- .08
0940	120	33	248	38	393	50	273	2.27
0950								
0960					60	34	60	
1010	150	29	349	29	354	26	204	1.36
1015								
1020	190	22	187	22	274	22	84	.44
1031	120	41	285	29	394	25	274	2.28
1032								
1041	190	42	125	36	189	35	- 1	.00
1042								
1110	80	13	80	13	83	13	30	.03
1120	150	29	168	23	197	21	47	.31
1130	40	20	48	22	165	21	125	.12
1140	10	5	145	34	36	18	26	2.60
1150	180	20	216	23	182	21	2	.01
1160	200	23	166	21	251	19	51	.25
1170	230	28	164	24	221	20	- 9	- .03
1180								
1190								
1210								
1220								
1230								
1310	570	30	623	27	483	24	- 87	- .15
1320	280	23	472	25	269	21	- 11	- .03
1330	140	25	342	25	247	19	107	.76
1340	250	28	510	25	446	22	196	.78
1410	100	23	314	25	301	26	201	2.01
1415								
1421	210	34	505	26	407	20	197	.93
1431	50	14	145	20	374	22	324	6.00
1440	80	18	163	20	183	18	103	1.28
1510								
1520	250	23	250	18	350	17	100	.40
1530								
1540	270	31	270	25	213	21	- 57	- .21
1550								
1610								
1620	270	32	303	23	202	20	- 68	- .25
1630	260	30	311	25	309	20	49	.18
1710								
1720								
1810								





## APPENDIX B

ZONE	#1961	%	#1964	%	#1967	%	CHANGE 1961-1967	%
1820								
1830								
1840								
1850								
1860								
1910								
1920								
1930								
1940								
1950								
1960								
2010	330	35	220	25	232	22	- 98	- .29
2020	260	25	237	27	170	24	- 90	- .34
2110	570	33	116	7	451	23	- 119	- .20
2120	140	30	116	29	95	28	- 45	.32
2130	360	42	391	33	222	31	- 138	- .38
2140	160	28	153	28	85	18	- 75	- .46
2211								
2212								
2220	200	42	154	41	125	32	- 75	- .37
2230	300	29	228	31	172	23	- 128	- .42
2240								
2250			60	35	108	31	108	
2310	400	29	318	28	276	21	- 124	- .31
2320	130	22	136	21	72	17	- 58	- .44
2330	490	35	288	30	249	25	- 241	- .44
2340	140	38	246	27	152	20	12	.08
2350	110	26	105	22	56	16	- 54	- .49
2360	20	15	86	19	134	17	114	5.70
2370	130	33	197	26	132	29	2	.01
2410	250	21	224	23	122	16	- 128	- .51
2420	200	28	186	28	217	21	17	.08
2430	240	38	203	28	117	18	- 123	- .51
2440	160	29	270	26	282	24	122	.76
2450			115	28	48	31	48	
2460	250	27	260	24	96	20	- 154	- .61
2470	240	22	301	23	302	18	62	.25
2510	290	39	254	37	74	36	- 216	- .74
2520	260	33	268	32	239	28	- 21	- .08
2530	430	33	470	35	369	27	- 61	- .14
2540	240	39	216	29	139	22	- 101	- .42
2550								
2610	280	36	306	32	291	25	- 11	- .03
2620	140	30	307	37	294	32	- 154	1.10
2630	420	34	466	35	500	34	80	.19
2640	740	39	658	32	517	27	- 223	.30
2710	130	28	403	31	516	30	386	2.46



## APPENDIX B

ZONE	#1961	%	#1964	%	#1967	%	CHANGE 1961-1967	%
2715								
2720	70	47	568	32	740	24	670	4.50
2730								
2810								
2820								
2910					39	20	39	
2920					19	13	19	
2930								
2940								
2950					14	17	14	
2960					15	27	15	
3010			197	30	113	20	113	
3015								
3021					225	28	225	
3020					120	25	120	
3030					69	32	69	
3040					213	30	213	
3050					193	32	193	
3110								
3120								
3130								
3140								
3150								
3160								
4111								
4112								
4121								
4122								
4123								
4131								
4132								
4133								
4141								
4142								
4151								
4211								
4221								
4222								
4231								
4241								
4242								
4243								
4251								
4252								
4253								
4261								
4262								



## APPENDIX B

ZONE	#1961	%	#1964	%	#1967	%	CHANGE 1961-1967	%
4263								
4271								
4272								
4273								
4274								
4281								
4283								
4291								
4311								
4312								
4321								
4322								
4411								
4412								
4413								
4414								
4421								
4431								
4432								
TOTAL	25,280	32	27,099	29	25,233	24	-47	No Change











**B30016**